VOL. XXXIII. PART 7 JULY, 1954
(*Issued August, 1954*)

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COMMONWEALTH MYCOLOGICAL INSTITUTE

REVIEW
OF
APPLIED MYCOLOGY

VOL. XXXIII JULY 1954

C. A. B.
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ERIKSSON (J.). **Ramaricium n. gen., a corticioid member of the Ramaria group.**—*Svensk bot. Tidskr.*, 48, 1, pp. 188–198, 2 figs., 1954.

Descriptions are given of *Ramaricium* n.gen. and *R. occultum* n.sp. isolated from the basal layer of fresh *Hylocomium* carpets in coniferous forests in Sweden. It differs from the genus *Ramaria* in being corticioid in form and having resupinate fructifications.

DINGLEY (JOAN M.). **The Hypocreales of New Zealand. V. The genera Cordyceps and Torrubiella.**—*Trans. roy. Soc. N.Z.*, 81, 3, pp. 329–343, 3 figs., 1953.

In this further contribution to the Hypocreales of New Zealand [cf. *R.A.M.*, 33, p. 184] eight species (three new) of *Cordyceps* and four (one new combination) of *Torrubiella* are described. All, except *T. cordyceps*, are pathogenic to insects. Included among those described are *C. tuberculata*, *C. robertsii*, *C. hauturu* n.sp., and *C. gunnii* [25, p. 112], all on lepidopteran larvae, *C. dovei* on a coleopteran larva, *C. lateritia* n. sp. on a coleopteran pupa, and *T. tomentosa* and *T. luteorostrata* [3, p. 212] on scale insects.

GROVES (J. W.) & LOVELAND (CONSTANCE A.). **The connexion between Botryotinia fuckeliana and Botrytis cinerea.**—*Mycologia*, 45, 3, pp. 415–425, 4 figs., 1953.

Apothecia produced in culture from isolates of *Botrytis* species of the *cinerea* type at the Division of Botany and Plant Pathology, Ottawa [*R.A.M.*, 18, p. 820], were reported by P. H. Gregory to be identical with de Bary's original material of *Peziza* (*Botryotinia*) [*Sclerotinia*] *fuckeliana* [28, p. 490]. Using the technique previously described [16, p. 750], matings between nine Canadian isolates from apples, potatoes, and celery established that the mating behaviour was of the bipolar type, and it was concluded that all the isolates belonged to the same species. Later, successful crossings were also made between the authors' single ascospore cultures and two Swiss isolates of *Botrytis cinerea* from vine, i.e., from the type host of *S. fuckeliana*, and near to the type locality. Apothecia from such crosses were morphologically similar to the type of *S. fuckeliana*.

It is concluded, therefore, that *S. fuckeliana* is established as the perfect state of *B. cinerea* [32, p. 667]. It is proposed that specimen No. 910.262.845 in the Persoon Herbarium, Leyden, Holland, should be designated as the lectotype of *B. cinerea*. A complete description of *S. fuckeliana*, based on the authors' material, is presented.

ALEEM (A. A.). **Olpidiopsis feldmanni sp. nov., champignon marin parasite d'algues de la famille des Bonnemaisoniacées.** [*Olpidiopsis feldmanni* n.sp., a marine fungus parasitic on algae of the family Bonnemaisoniaceae.]—*C. R. Acad. Sci., Paris*, 235, 20, pp. 1250–1252, 1 fig., 1952.

In May, 1952, the author observed the extensive parasitization of a red alga, *Falkenbergia rulfolanosa*, at Banyuls [Pyrénées-Orientales], France, by *Olpidiopsis*

feldmanni n.sp. [cf. *R.A.M.*, 30, p. 290], which produces spherical sporangia, 15 to 30 or up to 35 μ in diameter, or they may be subspherical or oblong, measuring 30 to 40 or up to 50 by 20 to 25 μ. The round or slightly pyriform, biflagellate zoospores, each containing a refringent droplet, measure 2·5 by 1·5 to 2 μ and are extruded through one, occasionally two or three conical tubes, 5 to 10 by 2 to 4·5 μ.

The same species was observed in the summer of 1950 on *Trailliella intricata* in Gullmar Fjord on the west coast of Sweden.

RAPER (K. B.), FENNELL (DOROTHY I.), & TRESNER (H. D.). **The ascosporic stage of Aspergillus citrisporus and related forms.**—*Mycologia*, 45, 5, pp. 671–692, 5 figs., 1953.

As a result of studies at the Northern Regional Research Laboratory, Peoria, Illinois, the authors recognize two further species of *Aspergillus* as ascosporic [*R.A.M.*, 32, p. 647], viz., *A. citrisporus* Höhnel emend. and *A. ornatus* n.sp. isolated from Wisconsin soil. The perithecia of the two species are closely similar and differ markedly from those previously reported in *Aspergillus*. They become purplish at maturity and superficially resemble the young sclerotia of the genus. These two species cannot be placed in the other ascosporic groups of the genus and it is necessary to recognize a fourth, potentially ascosporic group. For the present it seems that these species are best aligned with the *A. tamarii* group.

PETRAK (F.). **Beiträge zur Pilzflora von Ekuador.** [Contributions to the fungus flora of Ecuador.]—*Sydowia*, 4, 1–6, pp. 450–587, 1950.

Among the new species (numbering over 70) in this copiously annotated list of fungi from Ecuador may be mentioned *Ramularia phaseolina*, the agent of a destructive leaf spot of beans (*Phaseolus vulgaris*), which is characterized by fasciculate, erect, simple or branched, cylindrical to curved conidiophores, 40 to 80 by 3 to 7 μ, and hyaline conidia of very variable form and size, mostly elongate-ellipsoid or ovate, 7 to 18 by 4 to 6 μ. Two new genera, five new subgenera, and 13 new combinations are also described.

KANNGIESSER (W.) & DEUBNER (R.). **Elektronenmikroskopische Aufnahmen von Kartoffel-X-Virus in gefriergetrocknetem Tabakrohsaft.** [Electron microscope photographs of Potato virus X in freeze-dried crude Tobacco sap.]—*Naturwissenschaften*, 40, 16, pp. 442–443, 2 figs., 1953.

Electron micrographs of freeze-dried (as opposed to normal) preparations of crude tobacco sap infected by potato virus X [cf. *R.A.M.*, 26, p. 318] reveal in the virus rods definite and regular, transverse subdivisions, the significance of which is not at the moment understood.

GORDON (R. B.) & PRICE (W. C.). **Differentiation of Tobacco mosaic virus strains by differences in pH of maximum optical density.**—*Arch. Biochem., N.Y.*, 45, 1, pp. 117–123, 1 graph, 1953.

At the University of Pittsburgh, Pennsylvania, Oster's turbidimetric technique for determining the pH of maximum aggregation of viruses [*R.A.M.*, 31, p. 150] was applied to the differentiation of four wild (including the strain causing tomato rosette [31, p. 302]) and nine mutant strains of tobacco mosaic virus [32, p. 699]. The pH values for the 13 strains were within one pH unit range (0·22) for the type and its nine mutants. A mixture of viruses behaved like a single strain, giving the same type of turbidity curve with an equally sharp break, but the pH of maximum turbidity of the mixture was just midway between the values for the separate strains. Such a test, therefore, fails to distinguish a single strain from a mixture. A comparison of differences between the strains in rates of movement in Turkish

tobacco showed that the pH of maximum turbidity is probably not related to the time required for the virus to migrate from the inoculated mid leaf to the top of the plant.

Nichols (C. W.). **Thiouracil inhibition of Tobacco mosaic virus multiplication.**—*Phytopathology*, 43, 10, pp. 555–557, 1953.

At the Department of Plant Pathology, University of California, Berkeley, tobacco leaf disks infected by tobacco mosaic virus were floated for six days in continuous light (of 115 foot-candles) on aqueous solutions of thiouracil [*R.A.M.*, 33, p. 265] at concentrations of 1, 10, 100, and 500 mg. per l. without perceptible injury. Multiplication of the virus was most effectively inhibited at 10 mg. and upwards, the amount of virus recovered being 6 to 8 per cent. of that from those floated on distilled water [see next abstract], as compared with 85 per cent. at 1 mg.

In a similar series of tests infected disks without thiouracil produced more virus in the light than in the dark, but with 100 mg. thiouracil per l. the position was reversed. Leaf disks absorbed thiouracil equally well under both conditions, taking up five times as much of the chemical at 100 as at 10 mg. per l.

It proved impracticable to combine a mode of application and chemical concentration capable of reducing virus multiplication in growing tobacco plants without injury to the host. The least damage was caused by a daily soil drench (100 mg. per l.), which reduced the amount of virus recovered from both inoculated and young leaves to about 20 per cent. of that obtained from those treated with distilled water, and retarded symptom development by at least three days.

Kassanis (B.). **Some effects of sucrose and phosphorus in increasing the multiplication of Tobacco mosaic virus in detached Tobacco leaves.**—*J. gen. Microbiol.*, 9, 3, pp. 467–474, 1 graph, 1953.

In experiments at Rothamsted Experimental Station tobacco mosaic virus reached higher concentrations when inoculated White Burley tobacco leaves were placed in a solution containing 10 gm. per l. sucrose and 0·2 gm. per l. calcium phosphate than when in water [*R.A.M.*, 31, p. 317 and preceding abstract]. Detached leaves in water usually produced more virus than leaves on the plant. Other sugars and phosphates also increased virus production. Although sugar and calcium phosphate sometimes separately increased the virus concentration the response was generally greatest to both together. The increase varied with the nutritional status of the plants from which the leaves were taken and with certain environmental conditions. It was greater when the leaves were in the light than in the dark. Conditions which increased virus concentration also increased the total carbohydrates of the leaves.

Bradley (R. H. E.). **Ultra-violet irradiation of Tobacco infected with Potato virus Y and the availability of virus to aphids.**—*Nature, Lond.*, 173, 4399, p. 350, 1954.

In the Entomology Laboratory, Canada Department of Agriculture, Fredericton, New Brunswick, leaves of White Burley tobacco plants showing well-developed symptoms of potato virus Y infection [*R.A.M.*, 32, p. 402] were irradiated in darkness 15 cm. from a source of ultra-violet light [32, p. 469], the intensity of radiation of 2537 Å being about 2 mW. per sq. cm. When infective wingless *Myzus persicae* were fed for two minutes on the treated leaves immediately after irradiation the number of pairs out of 70 that transmitted the virus from leaves irradiated nil, two, four, and eight minutes were 68, 28, 11, and 1, respectively. There were far fewer transmissions when the aphids spent four hours on the leaves. Irradiation of one surface of a leaf did not affect the availability of virus from the other, nor did

irradiation appear to affect feeding behaviour. The availability of virus to the aphids returned to normal after the irradiated plants had been left to grow for a few days.

Preliminary infectivity tests indicated that if ultra-violet irradiation destroys infectivity *in vivo* then only a small part of the total virus in a leaf is so affected. In accounting for these results it is only necessary to postulate inactivation of potato virus Y in the epidermis [32, p. 402] of irradiated tobacco leaves.

Pelluchi (L[uisa]). **Chiave analitica per il riconoscimento delle principali virosi del Pomodoro.** [Analytical key for the recognition of the principal viroses of the Tomato.]—*Notiz. Malatt. Piante, 1953*, 23 (N.S., 2), pp. 21–28, 1953.

This key to the chief virus diseases of tomatoes is identical with a former one which has already been noticed [*R.A.M.*, 32, p. 699].

Cesaroni (F.). **Indagini sierologiche sul 'mosaico del Cetriolo' e sul 'fern leaf' del Pomodoro.** [Serological studies on 'cucumber mosaic' and 'fern leaf' of Tomato.]—*Ric. sci.*, 23, 8, pp. 1389–1398, 2 figs., 1953. [French, English, and German summaries.]

Further evidence is presented from serodiagnostic studies and inoculation experiments at the Institute of Plant Pathology, University of Milan, Italy, that fern-leaf of tomato is caused by a complex of the cucumber mosaic and tobacco mosaic viruses [*R.A.M.*, 29, p. 440; 32, p. 40], of which only the latter is transmissible from tomato to petunia and *Tropaeolum*. The presence of cucumber mosaic virus in spinach, beet, lettuce, and chilli, and of tobacco mosaic virus in spinach is detected by serodiagnosis.

Stone (H. M.), Clark (P. J.), & Jacks (H.). **Mercury residues on Tomatoes.**—*N.Z.J. Sci. Tech.*, Sect. B, 35, 4, pp. 301–306, 1954.

In greenhouse experiments at the Dominion Laboratory, Wellington, New Zealand, aerocide P.M.4 (containing 0·56 per cent. phenyl mercuric salicylate) was effective for the control of tomato leaf mould (*Cladosporium fulvum*) [*R.A.M.*, 33, p. 140] when applied at seven-day intervals. Mercury residues [32, p. 435] did not exceed 0·05 p.p.m., which is regarded as a permissible maximum on marketed tomatoes.

Gothoskar (S. S.), Scheffer (R. P.), Walker (J. C.), & Stahmann (M. A.). **The role of pectic enzymes in Fusarium wilt of Tomato.**—*Phytopathology*, 43, 9, pp. 535–536, 1953.

From the results of further experiments at the University of Wisconsin it is clear that *Fusarium oxysporum* f. [*F. bulbigenum* var.] *lycopersici* [*R.A.M.*, 33, p. 188] produces in pure culture a significant quantity of extracellular pectic enzymes, consisting for the most part of pectin methyl esterase, with a small proportion of polygalacturanase. Since the enzyme induces typical symptoms of wilt and vascular discoloration in tomato cuttings it is postulated to be the principal single factor in the causation of the disease.

Schmidle (A.). **Die Cytospora-Krankheit der Pappel und die Bedingungen für ihr Auftreten.** [The *Cytospora* disease of the Poplar and the conditions for its occurrence.]—*Phytopath. Z.*, 21, 1, pp. 83–96, 5 figs., 1953.

From the Institute for Forest Mycology, Hann.-Münden, Germany, the author describes his studies on the poplar disease caused by *Cytospora chrysosperma*, the imperfect state of *Valsa sordida* [*R.A.M.*, 32, p. 522], which he designates 'bark blight', because the fungus did not induce true cankers in outdoor inoculation

experiments in various localities in Lower Saxony and at the Institute for Forest Genetics, Schmalenbeck. Of over 600 inoculations performed on healthy one- to ten-year-old trees between February and October, 1952, and in February, 1953, only 24 caused bark infections. The results of experiments on pollarded trees immediately after topping showed that infection does not extend beyond the tissues bordering on the conducting elements. Following inoculation pycnidia developed after five to seven weeks on trees or branches weakened by artificial methods, and it is concluded that *V. sordida* is at most a perthophyte [32, p. 611], attacking exclusively enfeebled or moribund plants [2, p. 96; 19, p. 623; 28, p. 94; 30, p. 637, *et passim*]. The alleged enhancement of susceptibility during the dormant period [31, p. 523] was not observed in the present investigations, but this aspect of the disease merits further attention. Essential to its control is the cultivation of poplars in an environment affording no scope for the operation of weakening agencies.

Thomas (G. P.) & Podmore (D. G.). **Studies in forest pathology XI. Decay in Black Cottonwood in the middle Fraser region, British Columbia.**—*Canad. J. Bot.*, 31, 5, pp. 675–692, 4 pl., 1 graph, 1 map, 1953.

A detailed study of the decay of living black cottonwood (*Populus trichocarpa*) near Quesnel, British Columbia, caused mainly by *Polyporus delectans* and *Pholiota destruens* [cf. *R.A.M.*, 32, p. 521], revealed that despite a high incidence of infection in stands of merchantable-sized trees the average volume of decay per infected tree was low and important only to the recovery of special products such as plywood. Decay by *Polyporus delectans* was a brown pocket rot of the heartwood of living trunks. *Pholiota destruens* caused a whitish, later yellowish to tan, mottled rot with associated dark streaks in the heartwood of the butt; there was a significant reduction in the strength of wood in the early stage of decay. Altogether 70 species of fungi associated with decay were identified, *Stereum purpureum* being responsible for much of the decay found in dead trees.

The practicability of estimating hidden decay from the frequency of visual defects (basal scars, branch stubs, etc.) was demonstrated; 87 per cent. of the living trees at Quesnel were classified as suspect, the other categories recognized being residual (no decay indicators) and dead (no green leaves).

Greenidge (K. N. H.). **Further studies of Birch dieback in Nova Scotia.**—*Canad. J. Bot.*, 31, 5, pp. 548–559, 1 graph, 1953.

The results are presented of a study of the moisture relationships in healthy and die-back-affected yellow birch (*Betula lutea*) in Nova Scotia [*R.A.M.*, 33, p. 138]. Crown injury was classified on a scale from 1A to 6B, a modification of that proposed by Hawboldt and Skolko [28, p. 256]. The patterns of moisture movement were investigated by injecting water-soluble dyes into the lower boles of 77 trees of all injury classes from 1A (normal tree) to 4B (over half the crown dead, only small adventitious branches alive, usually confined to the base of the crown). Individual trees were felled and the distribution of the dye examined in cut bolts. Moisture distribution was studied by taking transverse disks from the butts, upper boles, and crowns of 167 trees in the same groups and dividing them into blocks to represent the outer and inner sapwood and heartwood, the moisture content of the blocks being determined on a dry weight basis. In addition the root systems were excavated by means of a four-nozzle water pump and samples taken from four sectors of the system to determine the percentage rootlet mortality for each tree.

The results of both the injection and the moisture distribution studies revealed well-marked differences in the moisture economy of trees in various stages of

decline, a gradual drying-out of the functional wood and later of the upper bole and crown accompanying the disorder in an individual tree. The locus of action of die-back appears to reside in the first instance in the roots and investigations are in progress to determine the factor or factors responsible for the initial widespread injury. The abnormally high rootlet mortalities which occurred in apparently healthy material were strongly suggestive of the presence of a root organism of primary parasitic importance or a major environmental disturbance. The possible influence of climatic conditions is being explored.

NISIKADO (Y.) & WATANABE (K.). **The large leaf spot of Chestnut.**—*Ber. Ōhara Inst.*, 10, 1, pp. 9–16, 5 figs., 2 graphs, 1953.

Large leaf spot (*Monochaetia desmazierii*) [*R.A.M.*, 9, p. 353] causes little damage to sweet chestnut in Japan, where it was first recorded in 1917. The tree has largely accomplished its current growth by the time infection appears in September, the disease reaching a climax during October and November. The circular lesions, 1 cm. in diameter, with a greyish centre and a dark brown or dark green, slightly rugose margin, enlarge and tend to coalesce, assuming an irregular outline and developing concentric rings, on which the black acervuli, 100 to 380 μ in diameter, are produced. The spots are usually brittle and readily fall, leaving large holes in the leaf. Heavy infection results in premature defoliation.

The optimum temperature for growth of the pale cinnamon-coloured mycelium on potato decoction agar was about 27° C., the minimum 5° to 10°, and the maximum 33° to 36°. The fusiform, straight or occasionally curved, normally 5-septate conidia, measuring 17·5 to 32·5 by 4·5 to 7·5 (average 25·9 by 5·6) μ in pure culture and 20·5 to 29·5 by 7 to 9·5 (23 by 7·5) μ on the host, are deep olive green, and are borne on hyaline conidiophores, 10·5 to 18·5 by 1·5 to 2·5 μ; they develop at a temperature range of 10° to 30°, with an optimum at 24°. Each is furnished with a terminal hyaline appendage, 35 to 50 by 0·7 to 1·8 (43·7 by 1·3) μ in culture and 6 to 11 by 0·7 to 1 (10 by 0·9) μ on the host. Secondary conidia produced on media with a low nutrient content measure 17 to 32·5 by 6 (25 by 4·8) μ, are usually scarcely coloured, and have very short appendages.

The minimum, optimum, and maximum hydrogen-ion concentrations for mycelial growth were below pH 3·2, 3·2, and 9·8, respectively, and for conidial development 3·2, 3·9 to 4·9, and 9, respectively.

AOSHIMA (K.). **Germination of the basidiospores of Elfvingia applanata (Pers.) Karsten (Fomes applanatus).**—*Bull. For. Exp. Sta., Meguro*, 67, pp. 5–18, 1 fig., 5 graphs, 1954. [Japanese version.]

In studies at the Laboratory of Forest Mycology, Meguro, Tokyo, on the germination of basidiospores from sporophores of *Elfvingia applanata* [*Ganoderma applanatum*: cf. *R.A.M.*, 33, p. 245] on oak (*Quercus myrsinaefolia*) at Meguro, it was found that their dormant period varied from one week to 12 months, by which time over 50 per cent. had germinated on agar media. Basidiospores stored in a dry condition lost their viability within the year. The optimum temperature for germination was between 23° and 28° C., while exposure to higher temperatures (35° for 48 hours or 40° for 24 hours) hastened the onset of germination.

National Shade Tree Conference devotes much of meeting to study of chemical control of tree pests.—*Agric. Chemic.*, 7, 9, pp. 79, 114–115, 117, 1952.

A. W. Hurford, speaking at the 28th Conference, held at Boston, Massachusetts on 18th to 22nd August, [1952], urged the protection of healthy elms against Dutch elm disease [*Ceratostomella ulmi*: *R.A.M.*, 32, p. 521], in preference to the removal of infected ones [33, p. 58], by a combination of pre-foliar DDT sprays, tree

sanitation, and chemotherapy, and indicated the need for co-operation by local authorities in halting its spread.

Aoshima (K.). **Butt-rot of Abies mariesii and A. veitchii caused by Tyromyces balsameus and Fomitopsis annosa.**—*J. Jap. For. Soc.*, 34, 10, pp. 305–307, 4 figs., 1952. [Japanese, with English summary.]

A brown butt rot of *Abies mariesii* in the mountainous regions of Honshu, Japan, was found to be caused by *Tyromyces* [*Polyporus*] *balsameus*. In the damper forests of Oze and Mt. Yatsugatake *A. mariesii* and *A. veitchii* developed a white butt rot caused by *Fomitopsis annosa* [*Fomes annosus*].

Robak (H.). **Über saprophytische und parasitische Rassen des Lärchenkrebspilzes Dasyscypha willkommii (Hart.) Rehm.** [On saprophytic and parasitic races of the Larch canker fungus *Dasyscypha willkommii* (Hart.) Rehm.]—*Z. Forstgenet.*, 2, 5, pp. 104–106, 1953.

This is the author's summary of his studies at the Vestland Forest Research Institute, Bergen, Norway, on physiologic specialization in *Dasyscypha* [*Trichoscyphella*] *willkommii* on larch, a notice of which from the original paper has already appeared [*R.A.M.*, 32, p. 406].

Wahl (I.) & Reichert (I.). **The die-back of Aleppo Pines and its relation to mycorrhiza development.**—*Palest. J. Bot.*, R. Ser., 8 (*1951–1953*), 2, pp. 196–204, 3 figs., 1953.

In a forest area of some 6,000 Aleppo pines (*Pinus halepensis*) growing near Ahuza, Israel, 550 died suddenly in 1933; 700 partly affected trees survived for a short period. Later, the disease spread rapidly, causing severe losses in the Esdraelon Valley and adjoining hill districts. In certain forest plots over 50 per cent. of the pines died. Damage was exceptionally severe on sites subject to drought and hot desert winds, on steep slopes, and on burned areas. *P. pinea* and *P. brutia* remained unaffected.

The needles of affected trees become yellow and the branches twisted and curled; a discoloration starting at the base of the needles, which droop and fall prematurely, becomes progressively more marked in the xylem of the branches and trunk, and ultimately reaches the roots. In studies over a number of years no pathogenic organism responsible for the condition could be detected. The mycorrhiza of affected pines [*R.A.M.*, 32, p. 46 and above, p. 370] are dark, thin, and sparsely branched and the Hartig net is thick, intracellular to a considerable extent, and reaches the endodermis, whereas in healthy trees the mycorrhiza are primarily ectotrophic, with a thin Hartig net confined to the outer cortex. Crops of *Boletus granulatus* were abundant on healthy plots, whereas the diseased yielded none.

It is concluded that the disease is associated with unfavourable ecological conditions reflected in a defective mycorrhizal development.

Krzysik (F.). **Zagadnienie Świerka odpornego na działanie opiénki.** [The problem of Spruce resistant to the activity of the honey fungus.]—*Sylwan*, 97, 1, pp. 23–25, 1953. [Russian and English summaries.]

Serious and threatening attacks by *Armillaria mellea* are reported on spruce stands [*R.A.M.*, 31, p. 534] in the Western Carpathian and Sudeten mountains of Poland, particularly on those grown from imported seed. The fungus was observed also on 150-year-old stands of native silver fir [*Abies alba*] and spruce, but they are healthy in appearance and believed to be resistant to the disease. The careful examination and protection of these stands is recommended and the use of their seed for mixed forest cultures.

Eades (H. W.) & Roff (J. W.). **The regulation of aeration in wood soil contact culture technique.**—*J. For. Prod. Res. Soc.*, 3, 3, pp. 68–71, 94–95, 1 fig., 1953.

Soil-block tests using the Leutritz wood-soil contact culture technique [*R.A.M.*, 25, p. 588] at the Vancouver Forest Products Laboratory have given more uniform results when a glass vent-tube (6 mm. diameter) has been set at an angle of 45° in the lid of the soil culture jar [cf. 33, p. 61] to standardize the gaseous interchange during decay of the test pieces. Any variation between replicate jars aerated by this method cannot be attributed to uneven ventilation.

In a trial run using *Lenzites trabea* [32, p. 160] and *Poria monticola* [32, p. 461] on western white pine [*Pinus monticola*] and western hemlock [*Tsuga heterophylla*], decay developed rapidly in aerated jars but only spasmodically in those stoppered with tight or loose screw caps and not at all in those with cemented-in rubber stoppers. Fungal activity, as measured by the loss in weight of the wood blocks, was more uniform and soil moisture content was higher and more constant in vented jars than in those with loose screw-caps.

Scheffer (T. C.). **Treatment of bilgewater to control decay in the bilge area of wooden boats.**—*J. For. Prod. Res. Soc.*, 3, 3, pp. 72–78, 95, 1 fig., 1953.

In a search for suitable chemicals at the U.S. Forests Products Laboratory, Madison, Wisconsin, to add to bilge-water to control decay in wooden boats not permanently in salt water, soil-block tests were carried out using *Fomes pinicola* [*R.A.M.*, 32, p. 461], *F. roseus* [loc. cit.], *Lenzites trabea* [see preceding abstract], *Polyporus* [*Polystictus*] *versicolor* [cf. 32, p. 292], *Poria monticola* [see preceding abstract] and *Stereum frustulosum*. In addition Petri dish tests were made using some of these fungi, *Polyporus tulipiferus* [31, p. 215], and *Ceratostomella* [*Ceratocystis*] *pilifera* [32, p. 160]. The woods used were white oak [*Quercus alba*], mahogany [*Swietenia* sp.], bald cypress [*Taxodium distichum*], and Atlantic white cedar [*Cedrus atlantica*], each being tested with the three fungi to which the wood was most susceptible.

All the chemicals tested increased substantially the decay resistance of blocks that had been soaked for one month. Oak and mahogany were damaged by solutions containing borax, which otherwise gave good decay control. Saturated water solutions of orthophenylphenol and pentachlorophenol completely inhibited fungus development, were harmless to all types of wood, and were economical. These chemicals had a low solubility which enabled them to be maintained in the bilge for long periods without replenishing.

Shigesawa (S.). **Studies on plywood. Report No. 4. The effects of treatment with sodium pentachlorophenate on the glue joints and the durability of plywood.**—*Bull. For. Exp. Sta., Meguro*, 67, pp. 137–152, 1 fig., 1954. [Japanese, with English summary.]

Rotary cut veneers from beech (*Fagus crenata*), *Kalopanax ricinifolius*, oak (*Quercus crispula*), and *Pentacme contorta* were soaked in 2 to 5 per cent. aqueous solutions of sodium pentachlorophenate [see next abstract] for from one to 20 hours. After drying and glueing into plywood with a variety of adhesives, the test pieces were exposed for a long time to conditions favourable for attack by *Penicillium* spp., *Aspergillus oryzae*, *Trametes sanguinea* [*Polystictus sanguineus*: *R.A.M.*, 33, p. 192], and *T. orientalis*. Adequate protection was given to soy-bean meal glue and casein glue by the addition of 5 per cent. sodium pentachlorophenate, based on the total dry weight. This treatment maintained the tensile strength of the glues, which rapidly deteriorated in untreated specimens. The surfaces of veneers (1·3 mm. thick) which absorbed 1 per cent. of the preservative on a dry weight basis were protected from fungal attack.

Aoshima (K.) & Hayashi (Y.). **Prevention of blue-stain of sawn timber of Pine with antiseptics.**—*Rep. For. exp. Sta., Tokyo*, 64, pp. 83–90, 2 pl., 1 fig., 1952. [Japanese, with English summary. Received 1953.]

Experiments were carried out at the Government Forest Experiment Station, Tokyo, Japan, on the control of blue-staining fungi on pine wood [see following abstracts] used for packing glass. The lowest concentrations of sodium pentachlorophenate [*R.A.M.*, 32, p. 599 and preceding abstract] to check the growth of *Graphium* sp., *Leptographium* sp., and *Ceratostomella* [*Ceratocystis*] *ips* [see next abstract] in culture were 0·005, 0·002, and 0·001 to 0·002 per cent., respectively, the corresponding percentages of uspulun being 0·02, 0·01, and 0·01 to 0·02. One spray of 5 per cent. sodium pentachlorophenate prevented the production of heavy blue stain by these fungi on wood protected from rain.

Aoshima (K.) & Kobayashi (T.). **Durability of blue-stained Pine wood.**—*J. Jap. For. Soc.*, 34, 9, pp. 289–293, 1 fig., 1952. [Received 1953.]

At the Government Forest Experiment Station, Tokio, Japan, pieces of blue-stained pine (*Pinus densiflora*) sap-wood [see preceding and following abstracts] infected by *Ceratostomella* [*Ceratocystis*] *ips* [*R.A.M.*, 33, p. 3], *Graphium* sp., and *Leptographium* sp.) were sterilized by autoclaving and inoculated with *Tyromyces* [*Polyporus*] *squalens*, *Cryptoporus* [*P.*] *volvatus*, *Hirschioporus* [*Polystictus*] *abietinus*, *Poria xantha*, and *P. vaporaria*. Comparisons made after 12 months of the loss in weight of the test pieces with that of rotted, non-stained sapwood showed that there was no significant difference in durability between the two.

Zabel (R. A.). **Lumber stains and their control in Northern White Pine.**—*J. For. Prod. Res. Soc.*, 3, 3, pp. 36–38, 1953.

The most common species of fungi causing blue stain [see preceding and following abstracts] in the sapwood of northern white pine (*Pinus strobus*) in the north-east of the United States are *Ophiostoma* spp., chiefly *O. coeruleum* [*Ceratocystis coerulea*: cf. *R.A.M.*, 31, p. 42]. Others associated with grey and black stains are *Alternaria* and *Leptographium* spp. In severe cases of stain the entire sapwood is discoloured, and black streaks are visible in exposed rays and resin canals.

A deeply penetrating chocolate-brown stain, developing on stored logs, has been observed recently on white pine in New York, and is caused by *Cytospora pini* [cf. 33, p. 327]. This stain is distinct from the chemical condition known as coffee stain which affects the heartwood as well as the sapwood.

Incipient decay due to *Fomes pini* [30, p. 205] is frequently evident as pink or red stains in the heartwood.

Recently *Penicillium cyclopium* [29, p. 130] and *P. crustosum* have been found to cause a deeply penetrating blue-mottled stain on timber which has been treated with organic mercurials.

Properly piled lumber is not usually stained before 15th May, stain being most serious in the summer up to 30th September, in the north-eastern States. If freshly-sawn lumber is kiln dried within three or four days, it ensures freedom from stain. During the wet weather of 1951 heavy staining developed in timber piled triangularly for rapid seasoning. Flat piling of timber which has been dipped in stain preventive is an efficient preventive method. Another effective way of eliminating sap stain is by ponding the logs during the summer season. Where this is not possible they should be sprayed with a suitable compound, such as permatox 10–S, melsan, noxtane, santobrite, or dowicide G, within 24 hours of felling. The present cost of anti-stain treatment is 15 to 20 cents per 1,000 board ft.

Kecklund (N.). **Sahatukeissa esiintyvän tukkisinistymän ja varastoimislahon vaikutus sahatavaran laatuluokkaan ja vahinkojen poistamiskeinot.** [Effect of

blue stain and storage rot in saw logs on quality class and means of eliminating the damage.]—*Paperi ja Puu*, 35, 8, pp. 320–326, 2 graphs, 1953. [English summary.]

In Finland logs are stored under various conditions, depending on local circumstances, until required for sawing. If storage is protracted [unspecified] blue stain [cf. preceding and next abstracts] and rots begin to appear which reduce the quality class of the timber and may attain considerable proportions. In this study the causes and extent of such depreciations are examined and suggestions advanced for assisting the complete rationalization of the industry by the use of prime-quality material alone [*R.A.M.*, 32, p. 653].

MATHIESEN-KÄÄRIK (AINO). **Eine Übersicht über die gewöhnlichen mit Borkenkäfern assoziierten Bläuepilze in Schweden und einige für Schweden neue Bläuepilze.** [A survey of the usual blueing fungi associated with bark beetles in Sweden and some blueing fungi new to Sweden.]—*Medd. SkogsforsknInst.*, 43 (*1953*), 4, pp. 1–74, 12 figs., 1954. [Swedish summary.]

This is a comprehensive, tabulated survey of a critical study of Swedish timber-blueing fungi [see preceding abstracts], covering the period from 1945 to 1952, the results of which up to and including 1950 have already been published [*R.A.M.*, 31, p. 42]. Descriptions are given of *Ophiostoma* [*Ceratocystis*] *ips* [29, p. 548], *O. galeiformis* (Bakshi) n.comb. [*C. galeiformis*: 30, p. 497], *Tuberculariella ips* [14, p. 138], *Graphium album*, and *G. aureum* (*Ann. Mo. bot. Gdn*, 17, pp. 59–114, 1906), all new to Sweden, and of five new species, namely, *O. brunneo-ciliatum*, *O. albidum*, *Monilia ferruginea*, *G. fragrans*, and *G. erubescens*.

Distinguishing features of *O. brunneo-ciliatum*, which was repeatedly found in association with *Ips sexdentatus* causing an intensive staining of thick pine logs, are its very dark (brownish-black or black) mycelium, exceptionally large, clavate synnemata, 800 to 1,500 or up to 2,500 μ in height (including the conidia-producing capitulum), with a black stem 16 to 60 or up to 220 μ in width; spherical, black perithecia, 226 to 272 (average 250) by 192 to 283 (246) μ, with very long beaks, 850 to 1,760 (1,330) μ long and 34 to 47 (45) μ wide at the base and 17 to 23 (20) μ at the apex, provided with 12 to 20 (18) brown, undulate, multiseptate setae, 28 to 43 μ long; and quadrate ascospores, 4 to 1·8 μ.

O. albidum, occurring mostly on very damp spruce and pine wood in direct contact with the soil, does not stain the substratum nor is it specifically attached to any particular bark beetle. It makes slow growth on malt agar (10 mm. in 10 days) and its globose, black perithecia are remarkably small, measuring 61 to 91 (79) by 66 to 85 (79) μ, with a beak 340 to 480 (423) μ long and 20 to 28 (25) μ wide at the base and 11·3 μ at the apex. The *Cephalosporium*-type conidia are 4·5 to 7·6 by 3·2 to 5 μ.

M. ferruginea, an ambrosia fungus growing in the galleries of *Xyloterus lineatus* on spruce and pine, is morphologically close to *M. brunnea* [*R.A.M.*, 22, p. 205] except for the dimensions of its reddish-brown conidia, 12·6 to 28 by 11·2 to 21·3 μ. *M. ferruginea* may produce a brown discoloration if the wood is sufficiently moist.

Differential characters of *G. fragrans*, a fortuitous concomitant of *I. sexdentatus* and *Orthotomicus proximus* in galleries in pine wood, are the strongly aromatic odour of fresh cultures, their greenish-grey colour, and the mutual inhibition of growth operating between monospore mycelia, which impart an intensive chrome-yellow colour to the medium. The spores are 7·5 by 3·3 μ and the synnemata 480–820 μ high with brown stalks.

Typical of *G. erubescens*, which was found causing a faint brown discoloration of floated pine logs and of boards in sawmills, is the reddish tinge of the cultures; the fairly large, broadly oval graphioid conidia are 2·8 to 6·1 by 1·9 to 2·8 (4·5 by 2·6) μ,

and the rather short synnemata 230 to 450 μ, with yellow-green, later brown stalks. The mycelial conidia are 3·4 to 8·2 by 2 to 4·4 (6·3 by 3·4) μ.

MANGENOT (F.). **Acidité ionique et populations fongiques des bois.** [Ionic acidity and fungal populations of timbers.]—*Rev. gén. Bot.*, 61, 721, pp. 133–153, 1954.

In studies carried out at the phytopathological laboratory of the École Nationale Supérieure Agronomique, Nancy, France, the pH values of 11 different timbers in the process of decay by fungi [cf. *R.A.M.*, 32, p. 112] were measured. Different parts of a trunk may have very different pH values, according to the different fungus floras present. In all timbers attacked by active wood-destroying hymenomycetes the acidity increased more or less considerably (pH 3·5 to 5·2). Those with blue stain [see preceding abstracts], but not attacked by any hymenomycete had values approaching those of healthy wood, but when such timber is invaded by a hymenomycete its pH value falls and tends to remain at about 4·4, though the value depends on which of the fungi preponderate. Conversely, if decayed timber is invaded by blueing fungi the pH value rises more or less markedly.

Pure culture studies of 33 lignicolous fungi showed that all the hymenomycetes (11 species) were in different degrees acid-forming. Some are weak acid-producers and are favoured to a slight extent by a pH value of 5·6, which is that of the healthy timber they attack. Others have a more marked effect and are favoured by low pH values; on some trunks such fungi may reduce the pH value to less than 4.

The pyrenomycetes and fuliginous fungi imperfecti have a neutralizing effect, and dark timbers often have a rather high pH value. *Leptographium lundbergii* [29, p. 509] and *Hyalodendron* [*Cladosporium*] *lignicola*, probably the agents of blueing, prefer an initial pH of 5·6 to 7·4. Discomycetes and certain imperfect forms are highly acid-forming and show a rather marked preference for substrates with a high pH value. Some appear early and reduce the pH, acting as precursors of the polypores. Some fungi, e.g., *Cladosporium elatum* and *Eutypa flavovirens*, are found on substrata with an acidity which is unfavourable or inhibitory to their growth.

It is concluded that although the ionic acidity of timber is not the only factor that determines its fungal flora, there are certain very close relationships between the two.

Committee of Inquiry into Timber Preservation in New Zealand.—*Aust. Timb. J.*, 19, 1, pp. 7–8, 10, 13–14, 51–52, 55, 57–58; 3, pp. 214, 217–218, 221–222, 1953.

This is a detailed report of a public inquiry held at Wellington, New Zealand, to investigate the advantages and disadvantages of the borax-boric acid process [*R.A.M.*, 30, p. 595; 32, p. 53] for the preservative treatment of timber, especially tawa [*Beilschmiedia tawa*], and the use of such timber for building purposes. Damage to exterior timbers due to *Fuscoporia* [*Poria*] *contigua* was occasionally reported, but always in association with faulty construction allowing wetting of the timber. Fungal decay in New Zealand is a problem only where timbers are in contact with the ground or in badly ventilated positions. Investigations in the Plant Diseases Division, Auckland, have shown that boric acid at a concentration of approximately 0·5 per cent. is toxic to a range of wood-destroying fungi. The Committee concluded that boron-treated timbers could be recommended for use in floorings and other internal structures, but that no water-soluble timber preservative was suitable for exterior woodwork. A list of 29 New Zealand publications on the subject is appended.

OLMSTEAD (R. L.). **Use of bow and arrow in collecting small limb samples.**—*J. For.*, 51, 10, p. 750, 4 figs., 1953.

For the rapid collection of small limb samples (several in less than 30 minutes)

from tall trees in Michigan a 45 lb. bow, long heavy metal arrow, and a special spinning and reel attachment is used. A light nylon line is shot over a high limb crotch to enable a $\frac{1}{4}$ or a $\frac{1}{3}$ in. manila line attached to it to be pulled over after it. A short-handled pole pruner is secured just below the head to one end of the rope and the other to the lower portion of the handle. The samples are cut by previously hooking the pruner over the branch to be cut and pulling on the rope which is tied to the handle.

Backus (M. P.) & Stowell (E. A.). **A Fusidium disease of Xylaria in Wisconsin.**—*Mycologia*, 45, 6, pp. 836–847, 10 figs., 1953.

Fusidium parasiticum [cf. *R.A.M.*, 4, p. 60], not reported before from the United States, caused a destructive disease of *Xylaria oxyacanthae* stromata beneath a hawthorn clump at Madison, Wisconsin, in the spring of 1951, a second epidemic developing during wet weather in early June, 1952. The fungus appeared as white, downy, mildew-like lesions, the infected stromata gradually shrinking and disintegrating without maturing ascospores. It was proved parasitic by inoculation and reisolation.

Miller (P. R.). **Lowland Rice culture as an economic control of Sclerotinia and root-knot nematodes.**—*F.A.O. Pl. Prot. Bull.*, 1, 12, pp. 183–187, 1953.

The information in this paper on the control of *Sclerotinia sclerotiorum* on vegetables in Florida by flooding has already been noticed from another source [*R.A.M.*, 32, p. 657].

Smith (M. A.) & Ramsey (G. B.). **Bacterial spot of Broccoli.**—*Phytopathology*, 43, 10, pp. 583–584, 1 fig., 1953.

Crates of California-grown broccoli at the Fresh Food Products Inspection Service of the Production and Marketing Administration, Chicago, harboured 25 per cent. infection by *Pseudomonas maculicola* [*R.A.M.*, 7, p. 226; cf. 31, p. 97]. The stems, petioles, florets, and leaves bore purplish-grey to black lesions ranging in size from a pin's point to circular or oblong spots, $\frac{1}{2}$ to 1 mm. in diameter. On the stems the infections tended to coalesce into lesions 3 to 5 mm. in length. Viewed by transmitted light, the leaf spots had the dark centre, surrounded by a halo, characteristic of *P. maculicola* on cauliflower. Inoculation experiments with isolates from the diseased broccoli plants on the same host and cauliflower resulted in the development of the typical symptoms observed in nature.

Croxall (H. E.), Gwynne (D. C.), & Broadbent (L.). **Turnip yellow mosaic in Broccoli.**—*Plant Path.*, 2, 4, pp. 122–123, 1 pl., 1953.

In October, 1952, broccoli plants growing at Morpeth, Northumberland, were affected by a disease shown by inoculation tests to be caused by turnip yellow mosaic virus [*R.A.M.*, 28, p. 261]. In a subsequent extensive survey of broccoli fields in the Northern N.A.A.S. Province the disease was found to be widely distributed, but not present farther west than 12 miles from the coast; Brussels sprouts, Ormskirk savoy cabbage, and Alexander's Late savoy were also infected.

In autumn and winter infection was light but the effect on the plants severe, many being stunted and some killed by frost, to which they were apparently more susceptible than healthy ones. In contrast spring infection was heavy but the symptoms less marked; the plants did not grow vigorously and tended to produce poor quality heads. On some holdings 5 to 10 per cent. of spring cabbages adjoining infected broccoli became affected.

Broadbent (L.) & Tinsley (T. W.). **Symptoms of Cauliflower mosaic and Cabbage black ring spot in Cauliflower.**—*Plant Path.*, 2, 3, pp. 88–92, 1 pl., 2 graphs, 1953.

Observations at Rothamsted Experimental Station in 1951 and 1952 demonstrated that cauliflowers affected by cauliflower mosaic virus [*R.A.M.*, 22, p. 122; 29, p. 342, and next abstract] may exhibit symptoms additional to those generally recognized, namely, vein-banding, vein-clearing, distortion, and enations. These take the form of discrete chlorotic local lesions, chlorotic spots with or without vein-clearing or vein-banding, and dark necrotic spots varying from mere specks to about 3 mm. in diameter [22, p. 49; 32, p. 528]. Strains of the virus causing slight symptoms in field cauliflowers produced only vein-clearing and slight distortion in turnip, whereas those causing severe symptoms in cauliflower killed turnips; in cauliflowers under glass different strains produced symptoms differing in severity.

When Extra Early Roscoff and St. George winter cauliflowers were grown in a glasshouse until symptoms began to appear and then divided into two batches, one batch being put outdoors, fully expanded leaves [? of the outside plants] above the inoculated ones developed no symptoms, and the largest of the partly expanded leaves often showed vein-clearing over only part of the leaf, generally the base; these leaves never developed vein-banding. Younger leaves frequently showed vein-clearing as a first symptom, and later developed vein-banding. The appearance of 'enations' was variable. Banding was invariably dark green at first, but sometimes lighter in subsequent leaves, fading from some of the younger leaves of indoor plants when temperatures averaged 25° C. for 20 days. The interveinal areas became dark green and lost the waxy 'bloom'; this was retained by the bands which became a dark, metallic blue. Some leaves were indistinguishable from healthy ones and usually remained so, even when put outside for two weeks. All leaves which developed symptoms at low temperatures retained them during hot weather. Young leaves which developed at high temperatures always displayed symptoms at first, though these rapidly became masked. Outdoor plants displayed symptoms throughout the period.

Symptoms of cabbage black ring spot virus on cauliflower [cf. 33, p. 4] consisted of chlorotic spots or rings 2 to 5 mm. in diameter, usually raised to form blisters. The spots lacked the waxy 'bloom' and were more apparent on the lower than on the upper surface of the leaves. They were mostly few and discrete, but occasionally so numerous that they merged into an indistinct mottle. On older leaves they were sometimes necrotic. Turnips were more affected than cauliflowers, some strains of the virus causing only pale blisters and blotches, though others greatly distorted the leaves, which rapidly died. When cauliflowers were infected simultaneously with cauliflower mosaic and cabbage black ring spot viruses early symptoms of both appeared, but quickly became obscured by generalized mottles.

Observations of time of appearance of symptoms agreed with those of Pound and Walker in the United States [25, pp. 53, 243]. In the field and glasshouse plants reacted more quickly to the viruses at high temperatures than at low but symptoms of cauliflower mosaic were more severe at low temperatures and those of cabbage ring spot less severe. Young plants also reacted more quickly than old plants. Shade (produced by a cage covered with two layers of muslin) retarded symptom development of both diseases under glass. The absence of symptoms from leaves immediately above inoculated ones suggests that the virus does not move into them, but moves to the growing point and into each leaf as it develops. No virus was found in symptomless leaves; neither virus enters fully expanded leaves unless they have been inoculated.

Nitrogen fertilizers increased the severity and rate of development of symptoms in Extra Early Roscoff cauliflowers inoculated with cauliflower mosaic virus, phosphate depressed them, and potassium had no significant effect.

Storey (I. F.) & Godwin (Ann E.). **Cauliflower mosaic in Yorkshire, 1950–51.**—*Plant Path.*, 2, 3, pp. 98–100, 7 graphs, 1953.

During late April and May in 1950 and 1951, surveys in the West Riding of Yorkshire showed that in all cases where infection by cauliflower mosaic virus [see preceding abstract] was present in broccoli crops, seed crops, summer cauliflowers, or brassicas of various kinds in allotments and gardens near one edge of the crop surveyed, the pattern of spread into the crop was similar. Most of this infection appeared to have been taken up by the first fifty rows (about 33 yards), except where the crop was on the site of a seed-bed and some of the plants had been allowed to grow on to maturity. No evidence was obtained that size of the virus source was important in determining the steepness of the infection gradient. Distances up to fifty yards between the source of infection and the edge of the crop did not greatly reduce incidence. A difference in varietal susceptibility to infection was noted in one locality.

Infection in the broccoli crops surveyed in 1951 appeared to come from two sources: (1) seed-bed and (2) diseased brassica crops in the vicinity after planting out. Both are important, but seed-bed infection would appear to be the more dangerous.

Sylvester (E. S.). **Host range and properties of Brassica nigra virus.**—*Phytopathology*, 43, 10, pp. 541–546, 1 fig., 1 diag., 1953.

In further studies at the University of California, Berkeley, on *Brassica nigra* virus [*R.A.M.*, 33, p. 128], inactivation followed ten minutes' exposure to a temperature of 60° C., the dilution end point was found to lie at about 10^{-4}, and survival at room temperature extended to 96 but not to 120 hours.

The results of inoculation experiments confirmed Takahashi's observations as to the non-susceptibility of tobacco and *Nicotiana glutinosa* [30, p. 208]. Kale, cauliflower, broccoli, cabbage, kohlrabi, and Brussels sprouts also reacted negatively in mechanical and aphid (*Myzus persicae* and *Rhopalosiphum pseudobrassicae*) transmission tests. Symptoms were confirmed on a number of *Brassica* spp. [loc. cit.] and were induced on turnip and swede by aphid inoculation.

A diagrammatic representation of the thermal and dilution end points and longevity of 26 crucifer virus strains corroborated the available evidence that the two recognized groups of crucifer viruses, i.e., turnip virus 1 [turnip mosaic virus: see next abstract], into which *Brassica nigra* virus fits, and cauliflower virus 1 [cauliflower mosaic virus: 30, p. 297 and preceding abstracts], are differentiable on the basis of thermal inactivation temperatures, under and over 70°, respectively. There is also reason to believe in the existence of a third group of aphid-transmissible crucifer viruses, with radish mosaic as its first original representative [18, p. 427], for which the designation radish virus 1 is proposed. It includes radish stunt [30, p. 354].

Pound (G. S.) & Weathers (L. G.). **The effects of air and soil temperatures on the multiplication of Turnip virus 1 in certain Nicotiana species.**—*Phytopathology*, 43, 10, pp. 550–554, 1 fig., 1953.

At the Department of Plant Pathology, University of Wisconsin, the systemic development of the cabbage A, cabbage black ring, and horse-radish strains of turnip virus 1 [turnip mosaic virus: *R.A.M.*, 30, p. 297 and preceding abstract] in *Nicotiana glutinosa* was much more rapid and abundant at air temperatures of 16° and 20° C. than at 24° and 28° [25, p. 243], whereas in the inoculated leaves the multiplication rate increased with rising temperature. In *N. multivalvis* systemic infection by both cabbage strains increased more rapidly at 28° than at 16° but ultimate concentrations varied little with temperature, while 20° was the optimum for the multiplication of cabbage A in *N. rustica*.

Soil temperature affected multiplication of the viruses in *N. glutinosa* in much the same way as air, but to a lesser extent, the process being favoured by increasing the soil temperature at 16° air and reducing it at 28°. The soil temperature effects, like those of the air, are reversible [cf. 33, p. 271].

Atkinson (R. G.). **Survival and pathogenicity of Alternaria raphani after five years in dried soil cultures.**—*Canad. J. Bot.*, 31, 5, pp. 542–547, 1953.

Soil cultures of five 'wild' types of *Alternaria raphani* from radish and of their five respective cultural variants [*R.A.M.*, 30, p. 208] that had become dry when four to six weeks old were still viable after five years at the Division of Botany and Plant Pathology, Department of Agriculture, Ottawa [cf. 33, p. 380]. The incidence of residual viable centres in cultures of four of the types was much higher than in those of their respective variants on the basis of colony counts from platings of 5 gm. samples diluted one-fifth. The reverse was true of the remaining wild type and its variant; this pair also differed from the others in that the wild type possessed little infectivity whereas the variant was highly virulent. No differences were observed in cultural characteristics after the five-year period and the virulence of the wild types to radish, stock [*Matthiola* sp.], and wallflower [loc. cit.] was unaltered.

Wenzl (H.) & Fuchs (H.). **Untersuchungen über die Schadensbedeutung der Vergilbungskrankheit der Zuckerrübe in Österreich.** [Investigations on the importance of the damage caused by the Sugar Beet yellows disease in Austria.]—*PflSchBer.*, 10, 5, pp. 88–92, 1953. [English summary.]

A tabulated account is given of comparative investigations at the Federal Plant Protection Institute, Vienna, to determine the extent of the losses caused by beet yellows virus [*R.A.M.*, 32, p. 528; 33, p. 272 and next abstract], using lots of 100 healthy and 100 diseased sugar beets from stands selected at random. On an average the reductions in the root, sugar, and leaf yields attributable to infection were estimated at 22·9, 27·2, and 9·9 per cent., respectively, with a corresponding fall of 4·7 per cent. in the sugar content.

Wenzl (H.) & Lonsky (H.). **Die räumliche Auswirkung von Infektionszentren der Vergilbungskrankheit der Rübe.** [The spatial operation of infection centres of the Beet yellows disease.]—*PflSchBer.*, 10, 7–8, pp. 97–111, 2 graphs, 1953. [English summary.]

Numerous observations and 13 statistical determinations in connexion with the severe epiphytotic of beet yellows in Austria in 1952 [see preceding and next abstracts] showed that in some localities the rate of infection declined very slowly with increasing distance from the focus in diseased seed plots and in others rapidly. Confirmation was obtained of reports from north-western Europe of a spread of infection over several kilometres [*R.A.M.*, 33, p. 194], and even on the simplified hypothesis of a linear decrease in the rate of infection the adopted minimum distance of 300 m. for a protective zone is undoubtedly too low and should be extended to several kilometres.

Giddings (N. J.). **Curly-top infection in southern California Potato seed stock fields.** —Abs. in *Phytopathology*, 43, 10, p. 587, 1953.

In August, 1952, the results of transmission tests to sugar beet demonstrated the presence of 8 to 10 per cent. infection of beet curly top virus [*R.A.M.*, 33, p. 332 and following abstracts] in potatoes being grown for certified seed in southern California. A month later similar tests on potatoes in another field with symptoms suggestive of curly top showed that the virus, which resembled curly top strain

No. 12 from Washington, was present in less than half the suspected plants, indicating that the effects of leafhopper [*Eutettix tenella*] infestation are not readily distinguished under local conditions.

GIDDINGS (N. J.). **Sugar Beet virus yellows infection influences subsequent curly-top infection.**—Abs. in *Phytopathology*, 43, 10, p. 587, 1953.

Tests on sugar beets in the western United States have shown that a plant recovering from yellows virus [*R.A.M.*, 33, p. 272] is more likely to contract infection with curly top virus [see preceding and next abstracts] than a comparable healthy specimen, and in a more severe form.

LACKEY (C. F.). **Histological studies of injury produced by a new curly top virus strain in resistant Sugar Beets.**—Abs. in *Phytopathology*, 43, 10, p. 588, 1953.

A new strain (11) of beet curly top virus [see preceding abstracts] isolated by N. J. Giddings [*R.A.M.*, 33, p. 197] was reported to attack the resistant sugar beet SL68 almost as severely as the susceptible SL842 [in California]. On the other hand, his virulent strain 1 [loc. cit.] is highly pathogenic to SL842 but causes little damage to SL68. The principal symptom of strain 1 on SL842 is acute phloem necrosis with relatively little hypertrophy in the petioles and root tips, whereas the petioles sustain the heaviest damage from strain 11, taking the form in both varieties of extensive phloem hypertrophy and necrosis. The general effect of strain 11 is more severe than that of strain 1. Considerable resistance to strain 11 was exhibited by an SL monogerm hybrid selection [33, p. 196], some of its phloem tissue still functioning despite marked hypertrophy.

BUCHER (R.). **Herz- und Trockenfäule, ihre Auswirkungen u. ihre Bekämpfung.** [Heart and dry rot, its effects and its control.]—*Zucker*, 6, 14, pp. 341–343, 1953.

In 1952 moderate to severe boron deficiency (heart and dry rot) developed in 14 out of 36 plots (each 50 sq. m.) in a sugar beet fertilizer experiment in the Würzburg district of Germany [*R.A.M.*, 31, p. 365 and cf. next abstract], causing a reduction of nearly a quarter of the root crop and a comparable (slightly higher) loss of sugar. The disturbance can be corrected by soil amendments with borax at 20 to 30 kg. per ha., except in periods of persistent drought, when artificial irrigation, supplemented by spraying with a 1 per cent. borax solution, gives excellent results, as reported by Hilpoltsteiner in *Bayer. landw. Wbl.*, *1952*, p. 1154, 1952.

SCHARRER (K.), SCHREIBER (R.), & KÜHN (H.). **Gefässversuche mit Futter- und Zuckerrüben über die Wirkung des Bors im Bor-Super- und im Bor-Rhenania-phosphat.** [Pot experiments with Fodder and Sugar Beets on the effect of boron in boron-super- and in boron-Rhenania phosphate.]—*Z. PflErnähr. Düng.*, 63 (108), 3, pp. 203–212, 12 figs., 1953.

In pot experiments at the Agricultural-Chemical Institute of the University of Giessen, Germany, boron plus Rhenania phosphate and boron plus superphosphate were compared with the phosphates alone for their effects on the health and yield of Deutsche Barres elite fodder (Dippe) beet and Dippes 'E' elite sugar beet on an originally very acid clay soil with a high humus content, adjusted to pH 7·5 by liming.

Not only did the addition of boron to the phosphates improve the health of the plants, but it produced extraordinarily large increases in yield, averaging about double for the foliage and quadruple for the roots and sugar content of fodder beets, while the corresponding rises for the sugar variety were $3\frac{1}{2}$-, 10-, and 12-fold, respectively. In the fodder beet tests boron superphosphate gave 10 per cent.

higher yields than boron Rhenania phosphate, whereas the latter was more effective for sugar beets, resulting in a 20 per cent. heavier increase than the former.

Applied as a top-dressing four weeks after sowing at a quarter of the boron-phosphate rate, i.e., 8·5 mg. per pot, borax alone cured the plants of boron deficiency [see preceding abstract] and resulted in foliage yields amounting to 90 per cent. of those in the boron-phosphate series but only about half the quantity of roots and sugar.

Hungerford (C. W.) & Pitts (R.). **The Sclerotinia disease of Beans in Idaho.**—*Phytopathology*, 43, 9, pp. 519–521, 3 figs., 1953.

From the Department of Plant Pathology, University of Idaho, evidence is presented that current-season infection of the bean [*Phaseolus vulgaris*] crop by the mycelium of *Sclerotinia sclerotiorum* [*R.A.M.*, 25, p. 592] may arise through contaminated soil, sclerotia, decayed bean seed [29, p. 599; cf. 30, p. 370], or rotted debris of the crop. Less than 1 per cent. seed-borne infection developed when beans from severely infected fields were planted the year after production, while only a trace was carried in two-year-old seed. The pathogen was unable to survive the winter at Moscow, Idaho, but sclerotia germinated readily after seven years' dry storage, producing ascospores which caused infection on growing bean plants. In the greenhouse ascospores discharged from apothecia were carried by air currents for distances ranging from 3 to 13 ft. to Pinto U.I. No. 72 bean plants emerging from the soil, 17 out of 200 of which were killed.

Henderson (D. M.). **Virus yellows of Shallots.**—*Plant Path.*, 2, 4, pp. 130–133, 1 fig. (between pp. 122 and 123), 1953.

Shallot virus yellows [? onion yellow dwarf virus: *R.A.M.*, 24, p. 133; cf. 33, p. 333], characterized by stunted growth and premature yellowing of the leaves, is stated to be widespread in Great Britain, causing marked reduction in the size of bulbs. The certification scheme introduced into Scotland in 1947 [27, p. 58] demands among other things that stocks shall be grown at least 50 yds from onions or other plants carrying more than 0·5 per cent. visible virus infection.

Preliminary experiments demonstrated that the virus was sap-inoculable with difficulty to young shallots and onions, but not transmissible to tobacco, *Datura stramonium*, *Nicotiana glutinosa*, or cucumber. *Aphis fabae*, *Myzus persicae*, and *M. ascalonicus* were found to be vectors; the first two feed with reluctance on shallot and often die a few days after colonization. In the experimental conditions the spread of the disease even over a distance of only 34 feet was slight. Therefore, the isolation of 50 yds. required under the Scottish certification scheme seems more than sufficient.

A comparison of yields of recently infected and symptomless plants showed an average of 54·5 gm. bulbs from infected as against 91·9 gm. (mean) for symptomless plants. With isolation there would appear to be no reason why a good stock should not be kept substantially free from infection indefinitely.

Wager (V. A.). **Leaf spot or blight of Carrots.**—*Fmg in S. Afr.*, 28, 332, pp. 393–394, 2 figs., 1953.

Leaf spot caused by *Macrosporium carotae* [*Alternaria dauci*: cf. *R.A.M.*, 32, p. 669] is prevalent on carrots in Natal, particularly during wet weather or when there is heavy dew at night. Yields are reduced and the bunches too unsightly for marketing. The disease may be prevented or cured by spraying, e.g., with home-made 4–2–40 Bordeaux mixture plus a spreader, or by dusting with copper lime [cf. 32, p. 462]. Dusting is recommended for large-scale plantings, 10 to 15 lb. per morgen [1 morgen = 2·17 acres] being applied by means of a rotary- or

bellows-type duster or by shaking from a cotton bag, preferably on a windless day when the plants are wet. Treatment should commence when the plants are six weeks old and continue at weekly intervals in wet weather, or fortnightly in dry, until harvest.

Greenleaf (W. H.). **Effects of Tobacco-etch virus on Peppers (Capsicum sp.).**—*Phytopathology*, 43, 10, pp. 564–570, 3 figs., 1953.

A destructive wilt of Tabasco chilli pepper (*Capsicum frutescens*), which appeared in Georgia in 1945 and in Alabama in 1950, was shown to be caused by tobacco etch virus [cf. *R.A.M.*, 33, p. 276]. Vein-clearing and faint, yellow flecks in the young leaves were the first perceptible symptoms, which appeared between four and 21 days after inoculation and were invariably accompanied or shortly followed by wilting. The disease was usually lethal, but a few two-month-old plants made a partial recovery, maintaining an apical tuft of leaves and ultimately producing some new shoot growth and a few fruits, though remaining severely stunted. Wilted shoots recuperated rapidly when cut and placed in water, but only a few roots were produced during a four-month period by stems of wilted seedlings cut off at soil-level, treated with rootone, and transferred to a coarse sand rooting medium.

Of the various peppers belonging to different species inoculated in quest of resistance to tobacco etch virus, P.I.152225 from Peru and South Carolina No. 46252 [32, p. 8] are likely to prove useful in a breeding programme. Five varieties of *C. pendulum*, including the commercial Serrano, and *Solanum pseudocapsicum* were tolerant of the virus and *S. carolinense* developed only mild infection. Eight of the newly introduced *Capsicum* species, among them *C. pendulum* and *C. microcarpon*, also *S. pseudocapsicum*, responded to tobacco mosaic virus by the localization reaction [14, p. 126]; Serrano became systemically necrotic. A new local lesion host for tobacco etch virus was found in a plant tentatively referred to *Chenopodium album*.

Vaughan (E. K.) & Yale (J. W.). **Ringspot-like viruses of Rhubarb.**—Abs. in *Phytopathology*, 43, 10, p. 590, 1953.

Symptoms suggestive of virus infection on rhubarb in the Willamette Valley of Oregon include chlorotic spotting, necrotic stippling, chlorotic and necrotic ring spots, vein-clearing, and a pale green mottle. In the field they are conspicuous during the early spring, becoming less noticeable in the summer. The virus isolated from diseased plants was sap-transmitted to Bountiful bean [*Phaseolus vulgaris*], broad bean, buckwheat, cucumber, curly dock [*Rumex ? crispus*], spinach, sweet william [*Dianthus barbatus*], and zinnia by carborundum rubbing. The symptoms thus induced on *P. vulgaris* and broad bean are similar to those induced by strains of tomato [tobacco] ring spot virus, while on *D. barbatus* they are sufficiently specific for the virus to be provisionally referred to the ring spot group.

Clark, a high-yielding Soybean.—*Seed World*, 73, 10, p. 8, 1953.

A new soybean variety, high in oil content and resistant to frog-eye leaf spot [*Cercospora sojina*: *R.A.M.*, 32, p. 603], has been developed at the United States Regional Laboratory, Urbana, Illinois, from a cross between a Lincoln × Richland hybrid and Lincoln. It is to be released to certified growers by the Nebraska, Iowa, Illinois, Indiana, and Missouri Stations in 1954 and will probably be available for general planting in 1955.

Hildebrand (A. A.). **An elaboration of the toothpick method of inoculating plants.**—*Canad. J. agric. Sci.*, 33, 5, pp. 506–507, 1 pl., 1953.

A toothpick method for inoculating plants (Abs. in *Phytopathology*, 42, p. 5, 1952) was modified at the Science Service Laboratory, Harrow, Ontario, in studies

on *Diaporthe* stem canker [*D. phaseolorum* var. *batatatis*: *R.A.M.*, 33, p. 275] and pod and stem blight (*D. p.* var. *sojae*) [loc. cit.] of soy-beans. Quill-type, wooden toothpicks are boiled and rinsed in three changes of tap water. They are cut in two transversely, placed sharpened end up in small glass vials (20 per vial), just covered with potato dextrose broth, and autoclaved. During the process the tips become exposed. The vial is inoculated and the growing fungus envelopes the protruding tips. The plant is inoculated by inserting a mycelium-enveloped toothpick tip into awl-punctures, the protuding end being cut off, and smearing the wound with vaseline. Up to 400 inoculations per day were made by this method.

New Watermelon in commercial trials.—*Seed World*, 74, 1, p. 18, 1954.

A new, high-quality watermelon variety, No. 51–27, resistant to anthracnose [*Colletotrichum lagenarium*: *R.A.M.*, 32, p. 465], *Fusarium* wilt [*F. bulbigenum* var. *niveum*: 33, p. 335], and some physiological disorders, developed at the South-eastern Vegetable Breeding Laboratory, Charleston, North Carolina, was subjected to trials in 1953.

Palti (J.). **Field observations on the humidity relationships of two powdery mildews in Israel.**—*Palest. J. Bot.*, R. Ser., 8 (*1951–1953*), 2, pp. 205–215, 1953.

Three years' observations on the occurrence of the powdery mildew diseases of cucumbers (*Sphaerotheca fuliginea*) and potatoes (*Oidium* sp.) [*R.A.M.*, 31, p. 139] in seven districts of Israel in relation to local macroclimatic humidity [cf. 26, p. 477] demonstrated that potato mildew was absent from the humid coastal plain and most frequent and severe in the drier districts. Outbreaks appeared to be associated with periods in which the mean atmospheric humidity between 8 a.m. and 7 p.m. fell below 50 per cent. The incidence of cucumber mildew appeared to bear no such relationship to atmospheric humidity and severity is thought to be influenced primarily by the age of the plants and cultural or irrigation factors.

Coleno (P.). **La désinfection des semences d'Arachide.** [Disinfection of Groundnut seeds.]—*Oléagineux*, 5, 3, pp. 149–155, 1 fig., 1950. [Received April, 1954.]

Experiments at Bambey, Senegal, during 1948 on the disinfection of groundnut seeds [*R.A.M.*, 33, p. 334] demonstrated that, whichever of three shelling methods was employed, increased germination resulted from the use of dust No. 1 (composition unknown) and No. 2 (an organo-mercurial at 150 gm. per quintal) as compared with No. 3 (copper chloride base, 20 gm. per quintal). In spite of considerable differences in the results between seed shelled mechanically or badly injured and that from the same source treated with a dust the use of treated, damaged, or low vitality seed is not recommended. Germination of all hand-shelled seeds, whether treated or not, was significantly superior (P 0·001) to machine-shelled, whether treated or not. On the whole, dust No. 1 is considered more effective than No. 2.

Boyle (L. W.). **Heat canker: a primary phase of collar rot on Groundnuts.**—*Phytopathology*, 43, 10, pp. 571–576, 2 figs., 2 graphs, 1953.

Some of the information in this paper has already appeared in a preliminary note [*R.A.M.*, 30, p. 444]. Heat canker and collar rot, which are erratic in occurrence and of variable severity on groundnuts in southern Georgia, are defined as two distinct diseases, the former being limited to stem injury by solar radiation at the soil surface, while the latter is used in a rather wide sense to connote primary damage by heat or other factors and secondary infection by [unspecified] weak parasites. Heat canker lesions are consistently situated at soil-level on the west to south-west exposure of the stem and develop after temperatures of 45° to 50° C. are reached at this site. Risk of injury may be minimized by the maintenance of a

finely clodded soil round the stem bases and by arrangement of the rows in such a way that the young plants can protect each other from direct exposure to the afternoon sun.

Hafiz (A.) & Ashraf (M.). **Studies on the inheritance of resistance to Mycosphaerella blight in Gram.**—*Phytopathology*, 43, 10, pp. 580–581, 1953.

At the Punjab Agricultural College, Lyallpur, Pakistan, crosses were made with two French types of *Cicer arietinum* (F 8 and F 10) resistant to blight (*Mycosphaerella rabiei*) [*R.A.M.*, 32, p. 300] and two Punjab susceptible, P 7 and C 7. All the F_1 progeny of these crosses and those of the two resistant parents were resistant: two susceptible types yielded susceptible hybrids only. Segregation among the F_2 and F_3 offspring indicated that inheritance is monogenic.

Nisikado (Y.) & Watanabe (K.). **On the rhizome rot of Lotus, Nelumbo nucifera Gaertn., caused by a new Fusarium, F. bulbigenum var. nelumbicolum Nis. et Wat.**—*Ber. Ōhara Inst.*, 10, 1, pp. 1–8, 2 pl., 5 figs., 1953.

A destructive rhizome rot of lotus (*Nelumbo nucifera*), co-extensive with the cultivation of the crop in Japan, first becomes noticeable early in July as a drooping of the leaves caused by curvature of the upper part of the petiole. The rhizomes develop superficial ridges or acquire a purplish coloration with brownish internal tissues. Rudimentary shoots on the rhizome, which normally remain dormant until the following year, sprout in the autumn and produce small leaves. Isolations from diseased rhizomes yielded a weakly parasitic bacterium, probably *Bacillus nelumbii*, and a highly pathogenic new variety of *Fusarium bulbigenum* designated var. *nelumbicolum*. It is characterized on potato decoction agar cultures by elliptical, very slightly curved, unicellular or occasionally uniseptate microconidia, 5·5 to 12·5 by 2·5 to 5 (average 8·6 by 3·7) μ; salmon-pink sporodochia, 1 to 2 mm. in diameter, produced after 20 days at 25° C.; crescent-shaped, predominantly triseptate macroconidia, with a curved, pointed tip and foot-shaped base, 25 to 46·3 by 3 to 4·8 (38 by 4) μ. The spherical, smooth chlamydospores measure 6·95 by 7·35 μ. Inoculation experiments on sterilized rhizomes with fragments of cultures resulted in the development of typical symptoms of the rot.

The lotus disease was most prevalent in the absence of rotations and in crops alternating with barley or rice every two to three years, the latter practice contributing to desiccation of the soil, which appears to favour the pathogen. Outbreaks of the rot are more common on light, sandy soils than on heavy ones, while iron deficiency is another predisposing factor.

Zobrist (L.), Clausen (R.), & Mühlethaler (P.). **Rebspritzungen mit dem Helikopter — vom Versuch zur praktischen Anwendung.** [Vine spraying with the helicopter—from experiment to practical application.]—*Schweiz. Z. Obst- u. Weinb.*, 62, 15, pp. 283–287, 3 figs., 1953.

In large-scale Swiss experiments in spraying vines from a helicopter for downy mildew [*Plasmopara viticola*] control [*R.A.M.*, 33, p. 277], an area of 83 ha. was covered in 20 working hours, comprising 102 flights and a total flying time of nine hours 42 minutes, using 13,600 l. (150 l. per ha.) of 6 per cent. cuprosan mixture, at a cost per ha. of Fr. 63 for application alone and Fr. 120 including the cost of the fungicide. In a vineyard of 30 ha. the work was accomplished in five hours, including two hours 28 minutes flying time, at a cost of Fr. 44 per application and Fr. 101 per ha. inclusive.

Peyer (E.). **Spätbefall mit Mehltau.** [Late infection with mildew.] -*Schweiz. Z. Obst- u. Weinb.*, 62, 20, pp. 390–392, 3 figs., 1953.

At the Wädenswil Experiment Station, Zürich, Switzerland, in 1953, late attacks

of vine [downy] mildew [*Plasmopara viticola*: see preceding abstract] assumed an unfamiliar form, characterized by a restricted mottling instead of the normal circular, expanding lesions. The rapidly developing chlorosis and partial or total desiccation of the affected leaves may well exert a very adverse effect on the quality of the grapes. Severe damage was restricted to vines that had been sprayed throughout the season with the insufficiently tenacious flit 406.

Hein (A.). **Die Bedeutung der Unkräuter für die Epidemiologie pflanzlicher Virosen.** [The importance of weeds in the epidemiology of plant viroses.]—*Dtsch. Landw.*, 4, 10, pp. 521–525, 1953.

This up-to-date summary of information on the function of weeds as reservoirs of important plant viruses is based on 31 contributions to the literature.

Smith (K. M.) & Lauffer (M. A.). **Advances in virus research. Volume I.**—xi+344 pp., 12 figs., 1 diag., 15 graphs, New York, Academic Press Inc., 1953. $8.00.

Included in the first volume of this new series of reports from the widely scattered literature on the progress of research on viruses affecting man, animals, insects, plants, and bacteria are essays (each followed by a bibliography) on the properties of bacteriophages by H. T. Epstein (pp. 1–38); interactions between viruses and virus strains by C. W. Bennett (pp. 40–67); transmission of plant viruses by cicadellids by L. M. Black (pp. 69–89); insect viruses by G. H. Bergold (pp. 91–139) [see next abstract]; and virus nucleic acids by R. Markham (pp. 315–332).

Smith (K. M.). **Some aspects of the behaviour of certain viruses in their hosts, and of their development in the cell.**—*Proc. roy. Soc.*, Ser. B, 142, 907, pp. 196–207, 4 pl., 1954.

In this Leeuwenhoek lecture delivered to the Royal Society on 5th November, 1953, the author gives a brief account of results achieved in the study of viruses affecting plants and insects [see preceding abstract] with the electron microscope. He describes some intranuclear inclusions caused by viruses, the observation of viruses inside the host cell, viruses in their insect vectors, and the morphology of viruses. There are some very good photographs of virus particles and a list of 42 references [cf. *R.A.M.*, 33, p. 102].

Barkley (F. A.). **Plant virus studies, I–VII.**—*Lloydia*, 16, 2, pp. 132–141, 1953.

After a brief introduction discussing the use of chemotherapeutic substances and antibiotics for the control of virus diseases of plants [cf. *R.A.M.*, 32, p. 151] (with 15 references) the author describes work carried out at the Department of Agriculture, Hope, Jamaica, which indicated that the mosaic viruses of bean (*Phaseolus vulgaris*) and *Malvastrum corchorifolium* are probably cross-infectious. Of seven substances tested chloromycetin [chloramphenicol] and aureomycin (each at 250 and 25 mgm. per 250 ml. nutrient solution) were strongly toxic to seedlings of both hosts. When *M. corchorifolium* plants with mosaic were treated with biosulfa (containing penicillin G and sulphazine products), chloramphenicol, neomycin, and fumagillin at least one out of four in each treatment began to produce normal leaves; in further tests homocysteine (0·2 ml. of 5 per cent. solution), furadoxyl (500 mgm.), furadantin (100 mgm.), dihydrostreptomycin sulphate (0·2 gm.), penicillin (200,000 units), fumagillin plus ascorbic acid (30 mgm.), and Newcastle virus (0·5 ml. 10^{-1}) appeared to give some control of the disease, though highly toxic to the plants.

Miller (P. R.). **Aster yellows on various hosts in the United States.**—*F.A.O. Pl. Prot. Bull.*, 1, 10, pp. 147–150, 1953.

Most of the information in this paper on western aster yellows virus [*R.A.M.*, 33,

p. 336] in gladioli [33, p. 297], carnations, and strawberries in the United States has already been noticed from other sources [32, pp. 433, 683].

WEBER (F.). **Eiweissspindeln (Viruskörper) in vergilbenden Pereskia-Blättern.** [Protein spindles (virus bodies) in yellowing *Pereskia* leaves.]—*Öst. bot. Z.*, 100, 3, pp. 319–321, 1 fig., 1953.

At the Institute of Plant Physiology, University of Graz, Austria, foliage of the cactus *Pereskia aculeata* was found to contain 'protein spindles' [*R.A.M.*, 32, p. 364], which remained intact during the process of autumnal yellowing but underwent drastic shrinkage as soon as the leaves fell and began to decay on the ground. These observations are regarded as consistent with the theory that the spindles represent virus bodies.

JACKS (H.). **Plant quarantine. II. List of plant diseases and pests intercepted in New Zealand in 1952.**—*N.Z. J. Sci. Tech.*, Sect. A, 35, 3, pp. 273–275, 1953.

The following were some of the diseases intercepted on plants and plant products introduced into New Zealand in 1952: die-back (*Diaporthe perniciosa*) [*R.A.M.*, 9, p. 41] and stem canker (*Fusarium lateritium*) [21, p. 3] on apple stocks from Holland, spur blight (*Didymella applanata*) on black currant from Canada [C.M.I. map No. 72], and cucumber mosaic virus on *Daphne odora* [*R.A.M.*, 32, p. 189] from Australia.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, 1, 10, pp. 158–159, 1953.

Regulations concerning the importation of plants and plant parts into Denmark [*R.A.M.*, 33, p. 278], which came into force on 1st July, 1953, are given.

The revised Flag Smut Quarantine (amending Foreign Plant Quarantine No. 59, relating to *Urocystis tritici* and No. 69, relating to packing materials), which became effective on 8th June, 1953, prohibits the importation into the United States (including the Virgin Islands) of wheat grain and wheat products, except flour and other products which have been so milled or processed that all spores of *U. tritici* have been destroyed, from Asia (most countries), Australia, Bulgaria, Caucasus, Chile, Cyprus, Egypt, Germany, Greece, Italy, Netherlands, Portugal, Spain, Tunisia, Turkey, and the Union of South Africa. Products which are permitted to be imported from these countries and territories are specified. The amended Packing Material Quarantine excepts from its provisions wheat straw, hulls, and chaff used as packing materials, when imported subject to the revised Flag Smut Quarantine from the countries and territories specified above.

LING (L.). **Digest of plant quarantine regulations.**—*F.A.O. Developm. Pap.* 23, vi+ 164 pp., 1952.

This digest, containing all the material in the first edition [*R.A.M.*, 29, p. 112], revised and brought up to date (August, 1952), gives abstracts of the laws and regulations of 40 countries governing the importation of plant material, based on information provided by the respective governments [cf. 32, p. 538].

BAWDEN (F. C.). **Plant pathology department.**—*Rep. Rothamst. exp. Sta., 1951*, pp. 76–88, 1952.

In further studies at Rothamsted [cf. *R.A.M.*, 31, p. 169] on the effect of ultraviolet irradiation on plant viruses [33, p. 54] the infectivity of partially inactivated and control preparations [? of tomato bushy stunt and tobacco necrosis viruses: loc. cit.] was found to be unaltered by dilution over a wide range of concentrations, and there was no evidence of 'multiplicity reactivation', by which particles that are non-infective singly can cause infection when two or more enter the same cell. The

only differences between dilution curves of irradiated and control preparations were at high virus concentrations, when the irradiated caused fewer lesions than might have been expected, evidence that the inactivated particles not only failed to reinforce one another, but interfered with the establishment of active ones. The inhibiting action on [unspecified] viruses of sap from leaves of sugar beet, cucumber, *Datura stramonium* [31, p. 531], and *Phytolacca decandra* [30, p. 306] showed much host specificity; sap had little effect in preventing infection of the species from which it was taken.

Studies are in progress [see below] on the original Rothamsted strain of sugar beet yellows virus [31, p. 169; 33, p. 272]; the necrotic strain N, isolated from a severely affected field plant in 1948; Irish mild yellows [28, p. 264]; '41' yellows from Ireland [30, p. 306]; beet yellow net virus [31, p. 170]; and yellow net mild strain. Rothamsted yellows and the N strain precipitate with a common antiserum, and plants infected with yellows are protected against N. None of the other four viruses has precipitated with yellows antiserum, and none of them protects against yellows or N. The '41' yellows virus was seed-transmitted in the Kleinwanzleben E variety. A study of the factors affecting the transmission of yellow net and the mild strain by *Myzus persicae* demonstrated that the former behaved qualitatively like yellows, though transmission was slower. Six aphids per plant were required to give workable numbers of infections, and a minimum of about 12 hours (six hours' infection and six hours' test-feeding) was necessary for transmission. Mild yellow net was transmitted more readily than yellow net, but caused less severe symptoms. Yellows virus passed out of a sugar beet leaf a few hours after inoculation by infective aphids whereas several days elapsed in the case of sugar beet mosaic virus.

Experiments were made under glass to ascertain in what manner spraying seckling beds with systemic insecticides may affect the transmission of yellows virus. Aphids fed for varying periods on unsprayed and pestox-sprayed infected plants were transferred to healthy test plants (five aphids per plant). With feeding periods of ten minutes and one hour few infections were obtained, but transmission from both sets was about equal. With feeding periods of 24 hours, however, aphids from the sprayed plants gave considerably fewer transmissions than those from the unsprayed, while after 48 hours few aphids were found on the sprayed plants. Infective aphids were also fed for periods of two to 28 hours on unsprayed seedlings and on those sprayed the previous afternoon with a mixture of pestox 3 [33, p. 132] and 14. For all feeding periods all the unsprayed except one became infected, while only half the number of sprayed seedlings developed symptoms. Field plots with a low plant population developed twice as much yellows per unit area as thickly planted plots with twice the number of plants [cf. 31, p. 217]. Spraying halved the number of infected plants.

In a small preliminary trial in 1950 virus Y [32, p. 691] increased in potato plots given different insecticidal treatments [cf. 31, p. 170] by the following factors: control (no treatment), ×31; E. 605, ×19; toxaphene, ×19; pestox 3, ×22; dieldrin, ×26; DDT, ×37. DDT appears to irritate aphids and cause them to move more frequently.

Preliminary tests indicated that cauliflower mosaic virus [cf. 32, p. 463; see above, p. 397] could be transmitted by *Acyrthosiphon pisum*, *Aulacorthum sonchi*, *Macrosiphum euphorbiae*, *Aphis fabae*, *M. rosae*, and *Nasonovia ribis-nigri*, and cabbage black ring spot virus [33, p. 192] by *Acyrthosiphon pisum*, *Aphis fabae*, and *M. rosae*. In 1950 cauliflower mosaic virus was more prevalent than black ring spot. In general the symptoms of the latter are conspicuous only on the lower leaves and growth is not seriously affected, even in cabbage, kale, and the cauliflower varieties that react clearly. Cauliflower mosaic virus causes severe disease in turnip and in most cauliflower varieties, and is moderately severe on kale and

mustard, though it is tolerated by cabbages and Brussels sprouts. The thermal inactivation point of cauliflower mosaic virus is 70° C. and the longevity *in vitro* six days, the corresponding figures for black ring spot being 60° and two days. Both viruses infected turnips more readily than other hosts, and turnips were the best source plants for insect transmissions. Both are non-persistent and are transmitted more readily when aphids are starved before feeding on infected plants [loc. cit.]. When aphids were kept at 4° at the beginning of the fast a smaller increase was obtained in the number of transmissions of cabbage black ring spot virus to tobacco than when they were starved at 17°, or first at 17° and then (immediately before infection feeding) at 4°. Increasing the numbers of aphids per test plant increased proportionately the number of transmissions. Small amounts of infective sap lost infectivity at approximately the same rate as infective vectors lost it when starved for six hours.

Studies on spore dispersal demonstrated that at wind speeds of under 5 m.p.h. the horizontal slide generally used in spore trapping [31, p. 251] gives much too low an estimate of the atmospheric concentration of spores, because the edge of the slide modifies the air flow. At wind speeds of over 10 m.p.h. it gives too high an estimate, because turbulence increases deposition. Over potato crops sporangia of *Phytophthora infestans* were trapped in quantity only between 8 a.m. and 6 p.m., with peak concentrations between 9 a.m. and 12 noon; conditions before noon may, therefore, have an important bearing on the spread of potato blight. In 1951 [31, p. 619] atmospheric spore concentrations were generally low, and for powdery mildews [Erysiphaceae] were the lowest since spore-trapping began at Rothamsted in 1947; few uredospores were present.

Experiments on mushroom 'mummy' disease [cf. 28, p. 269] gave no evidence to support the view that it is of virus origin.

On Broadbalk the cereal plots least heavily infected by powdery mildew [*Erysiphe graminis*: cf. 26, p. 296; 31, p. 618; 33, p. 147] were those which had not been manured, or which had received dung or phosphorus and potassium only; the most heavily infected were those given 4 and 6 cwt. of ammonium sulphate and 5 cwt. of sodium nitrate in the spring. Fallow also greatly increased incidence, plots on ground fallowed the previous year averaging almost twenty times as many pustules as the others. The effect persisted for one year only.

After one year of non-susceptible crops, both oats and spring-sown ryegrass [*Lolium* spp.] in 1950 eliminated take-all [*Ophiobolus graminis*: 33, p. 76] and greatly reduced eyespot [*Cercosporella herpotrichoides*: loc. cit.] in the 1951 winter wheat crop. In outdoor winter wheat in pots, grown for the third successive year in the same soil, eyespot reduced the mean yield of grain by 44 per cent. in unsprayed plants and by 9 per cent. in plants sprayed with sulphuric acid in spring. Spraying reduced the yield of uninfected plants by 13 per cent. and increased that of infected ones by 42 per cent. Take-all increased each year and was not affected by spraying. It decreased with increasing applications of ammonium sulphate and increased with increasing seed rate. Thus, in the most thickly sown pots with no ammonium sulphate 98 per cent. of the plants were severely infected, with dead roots, and the mean yield was 0·8 gm. per pot; in thinly sown pots receiving the heaviest applications the plants had no take-all, good roots, and yielded 17·1 gm. per pot.

The application of 0·5 gm. of nitrogen per pot in November, January, March, April, and May reduced eyespot loss in yield from 99 per cent. to 25, 34, 18, 39, and 62 per cent. and the percentage of severely infected ear-bearing straws from 100 to 24, 48, 11, 30, and 79, respectively. When 0·1 gm. of nitrogen was applied at sowing and 0·4 gm. subsequently, on the same five dates, losses were reduced to 22, 25, 11, 28, and 51 per cent., respectively, though the percentage of infected straws was unaltered.

Two isolates of *C. herpotrichoides* from wheat and one from oats penetrated more rapidly the leaf sheaths of mature, potted wheat plants growing in soil than those of barley and caused more severe lesions; with oats and rye penetration was slower and lesions less severe. The loss in grain yield was 39 per cent. in wheat, 22 per cent. in barley, and negligible in oats and rye. Wheat and rye grown in washed sand were penetrated more rapidly than barley and oats. In a pot experiment rye grown in soil was less susceptible than oats to an isolate from wheat, though in Denmark the reverse seems to be true [cf. 32, p. 172]. Therefore, Danish isolates from wheat and rye were compared with English ones from wheat and oats. In both soil and sand, the rye isolate penetrated more slowly into wheat and barley and much more rapidly into rye than the other three isolates. Differences in relative susceptibility in the two countries may be due to the prevalence of different strains.

When plants grown in sand were inoculated with *Corticium solani*, wild oats (*A*[*vena*] *fatua* and *A. ludoviciana*) were attacked and many rye and oat seedlings killed; wheat and barley were affected much less severely.

In studies on the survival of *P. infestans* in potato, naturally infected tubers from a 1950 field crop were stored in boxes and planted under glass in the spring of 1951. Of the 12 that produced shoots in March, six developed blight lesions. In field plots the resistant varieties Canso and Keswick developed blight about one month after the disease had appeared on surrounding Majestic plants; the strain attacking them was one of the B forms [33, p. 375]. Screen weather records were less reliable than readings taken in the crops for forecasting blight attacks.

Many sugar beets affected by downy mildew [*Peronospora schachtii*: 33, p. 273] are killed by frost, the disease being most prevalent after mild winters and when the monthly rainfall from June to September is between 1·5 and 3·5 in. Isolation from seed crops and other overwintering sources of the fungus gives control; serious outbreaks are uncommon at distances of over half a mile from such sources. Seedlings are readily infected, resistance increasing with age. In dry air spores remain viable for up to two weeks. In damp air some germinate in a few hours, while others require several days; the spores remain attached to the conidiophores, though in dry air they are readily detached.

Böttcher (H.). **Betriebswirtschaftliche Betrachtungen zu Pflanzenschutzmassnahmen.** [Observations on the working economy of plant-protective measures.] —*Dtsch. Landw.*, 5, 1, pp. 3–7; 2, pp. 64–69; 3, pp. 128–134, 4 figs., 1954.

The information here presented on the diseases and pests of agricultural crops from 1949 to 1952 was obtained by the inspection of 14 mostly large farms in central Germany [*R.A.M.*, 33, p. 205] where plant-protective measures were intensively practised.

The complete absence of damage from snow mould [*Calonectria nivalis*] on wheat and rye and from stripe disease [*Helminthosporium gramineum*] on barley [33, p. 13], and the unimportance of wheat bunt [*Tilletia* spp.], all formerly widespread, are undoubtedly attributable to regular chemical seed treatment. Occasional light infection by loose smut of oats [*Ustilago avenae*] resulted from failure to use the increased rate of 300 gm. chemical per doppelzentner [100 kg.] now prescribed for the control of this disease. Barley loose smut [*U. nuda*: loc. cit.] was considerably more prevalent in 1951 and 1952, its incidence mostly ranging from 1 to 3 per cent. Like loose smut of wheat [*U. tritici*: loc. cit.; 33, p. 342], which did not occur during the period under review, *U. nuda* is controllable by seed treatment with hot water, facilities for the co-operative application of which are available [32, p. 123]. Important progress has been made during the last few decades in the development of wheat and barley varieties with combined resistance to mildew [*Erysiphe graminis*: 33, p. 23] and rusts (*Puccinia* spp.), but mildew was responsible for fairly severe damage in densely planted stands liberally manured with nitrogen.

Potato viroses are a source of heavy losses [33, p. 373] and their indirect control by the use of 'seed' from healthy areas is very costly. However, none of the other methods hitherto tested [loc. cit.] holds any promise of success.

In experimental plots on one of the farms in 1950 Frühnudel, Sabina, Capella, and Hilla were rated as barely susceptible to blight (*Phytophthora infestans*) [33, p. 251]. All other varieties were susceptible, some highly so. Two prophylactic treatments with Bordeaux mixture should be given.

On three farms the crop reductions caused by foot rots of peas (*Ascochyta pisi*, *A. pinodella*, and *Mycosphaerella pinodes*) [31, p. 584] were estimated at 52 to 76, 56, and 60 per cent., respectively. Remedial measures include seed disinfection, use of resistant varieties, and an extended rotation period, allowing a lapse of at least four years between one pea crop and the next. Little or nothing can be done to lessen the damage from rust [*Uromyces pisi*], mildew [? *E. polygoni*], and *Fusarium*. Experimental red clover plots on one of the farms were attacked by mildew [? *E. polygoni*], while on another a stand had to be ploughed up on account of canker [*Sclerotinia trifoliorum*: 31, p. 286].

Pryadchenku (A.). Перспективы улучшения сельскохозяйственных культур в Румынской Народной Республике. [Prospects of improving agricultural crops in the Rumanian People's Republic.]—Земледелие [*Zemledelie, Moscow*], 2, 1, pp. 93–104, 6 figs., 1954.

During investigations in Rumania the spring wheat varieties Ikar 142 and Marquis were found to be resistant to brown rust [*Puccinia triticina*: *R.A.M.*, 25, p. 442] and the former to loose smut [*Ustilago tritici*: 23, p. 142]. Chenad 88 oats was resistant to rust [*Puccinia* spp.] and the potato varieties Kluzh 43/30, Voran, and Akersegen to wart [*Synchytrium endobioticum*: 28, p. 81; 33, p. 173].

Çalışma raporu 1952 İzmir-Bornova Ziraat Mücadele Enstitüsü. [Annual Report for 1952 of the Izmir-Bornova Plant Protection Institute.]—34 pp., 11 figs., 2 graphs, 1953. [English summary.]

It is stated on pp. 11–16 of this report from Turkey [cf. *R.A.M.*, 32, p. 545] that during the 1952 season no difference was observed between untreated cotton fields and those treated with ceresan against angular leaf spot [blackarm] (*Pseudomonas* [*Xanthomonas*] *malvacearum*) [29, p. 153]. A twig disease of fig trees caused by an [unidentified] bacterium was best controlled by cleaning the wounds and treating them with Bordeaux mixture or ceresan-nazebize followed by Juniper tar. During the last 30 years virus diseases have become much more important. Among those noticed in 1952 were tobacco mosaic virus on tobacco, [tomato] spotted wilt on dahlias [C.M.I. map No. 8], and cucumber mosaic virus on pumpkins and tomatoes.

Wiltshire (S. P.). **Plant diseases in British Colonial Dependencies : a half yearly report.**—*F.A.O. Pl. Prot. Bull.*, 1, 12, pp. 177–178, 1953.

In Tanganyika Panama disease of bananas (*Fusarium oxysporum* f. *cubense*) [*R.A.M.*, 32, p. 324] spread during 1952 to the Pare District, and leaf spot (*Cordana musae*) [C.M.I. map No. 168] was found for the first time in Muhesa. Bacterial blight of peas (*Pseudomonas pisi*) [*R.A.M.*, 32, p. 114] spread to Iringa and Mbeya. Other new records for Tanganyika included apple canker (*Botryosphaeria ribis*) [cf. 32, p. 669], *Curvularia lunata* in cultures from banana rhizome tissue, *Fusarium solani* on sisal, lucerne leaf spot (*Pseudomonas syringae*), and *P.* (?) *glycinea*, previously referred to *P. syringae*, on Lima bean [*Phaseolus lunatus*]. In Northern Rhodesia anthracnose (*Colletotrichum tabacum*) [cf. 26, p. 422] caused serious injury to tobacco seedlings.

In Hong Kong the following were reported though not confirmed: banana

freckle (*Macrophoma musarum*), citrus scab (*Elsinoe fawcetti*) [C.M.I. map No. 125], canker (*Xanthomonas citri*) [No. 11; cf. *R.A.M.*, 28, p. 393], and black spot (*Phoma* [*Guignardia*] *citricarpa*), papaw scab and anthracnose (? *Colletotrichum gloeosporioides*), and peach shot hole (*Clasterosporium carpophilum*) [C.M.I. map No. 188] and rust (*Puccinia pruni-spinosae*) [No. 223].

In Grenada some success in the control of cacao witches' broom (*Marasmius perniciosus*) [*R.A.M.*, 29, p. 14; 33, p. 219] is being attained.

Tarr (S. A. J.). **Plant pathology.**—*Rep. Res. Div. Minist. Agric., Sudan, 1949–1950*, pp. 46–55, 1952. [Received 1954.]

In this report [cf. *R.A.M.*, 32, p. 117] it is stated that the incidence of cotton blackarm (*Xanthomonas malvacearum*) [33, p. 228 and below, p. 423], was light in the Gezira, causing little crop loss, but at the Gezira Research Farm most of the plots were affected, the varieties JR1530 and RDS being severely attacked.

The incidence of cotton leaf curl virus [loc. cit.; 32, p. 376] was remarkably low at the Research Farm and in all other parts of the Sudan, possibly owing to the reduction in numbers of white fly [*Bemisia gossypiperda*]. Leaf curl was observed on many illegally cultivated *Hibiscus esculentus* plants, constituting a potential source of infection for the next cotton crop. In transmission experiments with infective white flies Enau's Brown Egyptian cotton (*Gossypium barbadense*) appeared to be resistant, *G. contextum* developed papillae on the upper leaf surfaces and some slight vein-clearing but no typical symptoms, and six varieties of *G. hirsutum* developed leaf mosaic on 25 to 92 per cent. of the plants. Leaf curl symptoms appeared on inoculated *Althaea kurdica*, *A. pontica*, *A. sulphurea*, and *Malva moschata*, but not on *H. diversifolius* and *H. huegelii*.

A number of American cotton plants at Busata were infected by a powdery mildew (? *Sphaerotheca fuliginea*); the variety X1730A was unaffected.

Powdery mildews were very common on a wide range of vegetables, including *H. esculentus* and cucurbits, the most widespread being *S. fuliginea* and *Leveillula taurica*.

Covered smut of sorghum (*Sphacelotheca sorghi*) [32, p. 118] was present in considerable amounts where untreated seed was sown but rare following treatment with copper carbonate. *Xanthomonas phaseoli* [32, p. 117] was widespread on early-sown, rain-grown lubia (*Dolichos lablab*). The unidentified virus causing leaf curl of tomatoes [loc. cit.] was less common than in previous years.

Briant (A. K.). **Annual Report of the Department of Agriculture, Zanzibar Protectorate, 1952.**—29 pp., 1953.

In this report [cf. *R.A.M.*, 28, p. 6] it is stated that maize rust (*Puccinia polysora*) [33, p. 281], first observed in Zanzibar [32, p. 309] on 1st August, is now widespread throughout the Protectorate, including Pemba Island.

Attempts have been made to minimize branch breaking of clove trees to prevent the entry of the die-back organisms, *Valsa* [*eugeniae*: 33, p. 180] and *Cryptosporella eugeniae* [loc. cit.]. Die-back control by pruning and surgical treatment of young trees followed by painting the wounds with a suitable protectant has been demonstrated to planters in Pemba and is now more popular than hitherto. Two long-term field experiments are to be carried out on sudden death [*V. eugeniae*]. One, in Pemba, will consist of various combinations of treatments such as trenching, liming, and immediate removal of dying trees with a view to arresting the spread of the disease. On old sudden death land in Zanzibar where re-planted clove saplings are liable to be affected by 'slow decline' caused by the same fungus, liming, soil disturbance, and planting with ground crops for various periods will be combined with the removal from the soil of as much old root material as possible to find a means of re-establishing healthy trees.

Plant diseases—Certified Bean seed ; its production, use and benefits. Brown rot of stone fruits.—*Agric. Gaz. N.S.W.*, 63, 8, pp. 426–430, 5 figs., 1952.

A summary is given of the requirements for producing certified bean [*Phaseolus vulgaris*] seed in New South Wales [cf. *R.A.M.*, 25, p. 22; 32, p. 175; 33, p. 211], which remain essentially the same as when introduced. The precautions to be observed before and after planting are included.

Most of the information on the control of brown rot of stone fruits (*Sclerotinia fructicola*) [27, p. 246; 31, p. 612] has already been noticed [23, p. 166]. Thiram should control the disease on early maturing apricots [33, p. 361]. An efficient wetter with or without a sticker should be added to all the recommended sprays.

DADANT (R.). **Contribution à l'étude des maladies du Cocotier, du Cacaoyer, et du Caféier aux Nouvelles-Hébrides.** [A contribution to the study of the diseases of the Coconut Palm, Cacao tree, and Coffee bush in the New Hebrides.]—*Agron. trop., Nogent*, 9, 1, pp. 41–48, 6 figs., 1954.

In two visits to the French New Hebrides in 1951 and 1952 the author found that coco-nut palms were affected by stem bleeding (*Ceratostomella* [*Ceratocystis*] *paradoxa*) [C.M.I. map No. 142; cf. *R.A.M.*, 33, p. 152], thread blight (*Corticium penicillatum*) [cf. 5, pp. 215, 716; 19, p. 531], the most prevalent disease, grey blight (*Pestalotiopsis palmarum*) [loc. cit.; cf. 6, p. 608; 28, p. 489], the damage caused by which is not serious, and tapering stem or pencil point [cf. 16, p. 670; 19, p. 531; 29, p. 559], a physiological condition caused by planting in unsuitable situations.

Cacao occupies a less extensive area than coco-nut. The shade trees are of many different species and so planted that the cacao, which is nearly always growing in unsatisfactory cultural conditions, lacks air and light. *Phytophthora palmivora* [32, p. 304] causes pod rot, resulting in losses of 80 per cent. in wet seasons, as no control measures are applied, and branch canker. Parts destroyed by *P. palmivora* are not infrequently invaded by *Botryodiplodia theobromae* [cf. 32, p. 303]. Also present are anthracnose of the pods (*Colletotrichum* sp.), thread disease of the lower leaf surface, peduncles, and thin branches (*Corticium* sp.), horse-hair blight (*Marasmius equicrinis*) [cf. 27, p. 261], and foot rot (*Fomes* sp.) which causes serious losses in heavy, damp soil.

Coffee (*Coffea robusta*) is of much less economic importance locally. Most of the plantations were abandoned years ago; no crop is picked, but the bushes bear a large yield of healthy berries, and the plant seems to be much more productive than in New Caledonia. Only foot rot (*Fomes* sp.) and anthracnose (*Glomerella cingulata*) [see below, p. 422] were detected.

The author concludes that in the French New Hebrides no serious disease of coco-nut is present, and normal cultural practices would effectively control *P. palmivora*, almost the only serious parasite of cacao, and *B. theobromae*.

Rapport annuel pour l'exercice 1952. [Annual report for the year 1952.]—*Publ. Inst. nat. agron. Congo belge, 1952* (hors ser.), 395 pp., 1 map, 1953.

The following items occur in the sections of this report dealing with phytopathological work in the Belgian Congo [*R.A.M.*, 33, p. 143]. At Yangambi (pp. 77–84) oil palm seedlings were severely attacked by *Cercospora elaeidis* [28, p. 31]. Damage to rubber by *Oidium heveae* [33, p. 143] and *Helminthosporium heveae* [31, p. 422; 33, p. 257] was less severe than previously. Groundnuts were heavily attacked by foot rot (*Sclerotium rolfsii*) [cf. 31, p. 47], but spraying with a 2 per cent. ammoniacal solution of copper acetate arrested spread. Treatment of groundnut seed with a systemic insecticide containing 10 per cent. isopropyl-methlypyrazolyl-dimethylcarbamate, at concentrations of 0·01 and 0·1 per cent. controlled the insect vector [*Aphis craccivora*] of rosette [virus] for 15 and 23 days, respectively, after

sowing [loc. cit.; 27, p. 406; 31, p. 315]. When groundnut seed was stored for eight months, then shelled manually, and treated against damping-off [cf. 33, p. 403] with ceresan, spergon, and graminon, the percentage emergence in disinfected soil after 18 days was 52·4, 51·8, and 52·3, respectively, as against 44·4 for the untreated. Similar treatment of mechanically shelled seed with ceresan, semesan, spergon, and graminon gave, respectively, 45, 43·4, 45·5, and 46·4 per cent. emergence, as against 25·4 per cent. for the untreated. In soil infested with *S. rolfsii*, *Rhizoctonia* sp., and *Rhizopus nigricans* [*R. stolonifer*] one day after sowing, the fungicidal effect of the treatments persisted for some time after germination.

When coffee seedlings (*Coffea robusta* lines Y.410, S.A.158, S.A.24, and L.52) were inoculated by dipping the roots in a suspension of spores and mycelium of the tracheomycosis *Fusarium* [*Gibberella xylarioides*: 33, p. 143] and planted in disinfected containers, the organism was re-isolated later from 20·2, 33·3, 34·9, and 40·4 per cent. of the plants of these lines, respectively.

The strains of *Fomes lignosus* isolated from rubber locally [31, p. 423] are very uniform, whereas those of *Armillaria mellea* [27, p. 382; 30, p. 512] display morphological differences corresponding with different degrees of parasitic activity. At Yangambi development of *F. lignosus* is conditioned by temperatures between 24° and 35° C., with an optimum at 28°. Two mycorrhizal fungi, species of *Endogone* and *Rhizoctonia*, were invariably associated with rubber rootlets and were also found on cacao.

In work at the Mulungu regional laboratory (pp. 95–97) several fungi were frequently isolated from *Pyrethrum* [*Chrysanthemum*] *cinerariifolium* plants attacked by *Ramularia bellunensis* [32, p. 627; 33, p. 140], and the exact part played by this fungus in the disease complex is to be investigated.

In studies at the Kaniama regional laboratory (pp. 97–102) Kentucky 16 and Yellow Mammoth tobacco plants given ten treatments with copper oxychloride (50 per cent. copper, 2·5 kg. per h.), copper oxide (80 per cent. copper, 2·5 kg.), and the latter diluted with tobacco powder (± 20 kg.), then sprayed 15 times with the spores of various leaf-spotting organisms [? including *Cercospora nicotianae*, *Alternaria longipes*, and *Pseudomonas tabacum*] developed, respectively, 77, 57, and 59 spots to every 100 on the untreated.

Potato tubers lifted in February, 1952, and treated three days later with copper oxide, tetrachloroparabenzoquinone, tribasic copper sulphate, and 70 per cent. ferbam, all at 30 gm. per l. water, and the dusts, tetrachloronitrobenzene, dichloronaphthoquinone, tetrachloroparabenzoquinone, a powder with a thiram base, and a mixture of a quinone chlorate derivative with 2 per cent. thiophosphate, all at 5 gm. per 25 tubers, were in a better condition after nine months' storage than the untreated. In a second trial, with a storage period of eight months, good results were given by dichloronaphthoquinone, thiram, and tobacco powder, each mixed with 2 per cent. thiophosphate and applied at 5 gm. per kg. tubers. When potato plants inoculated by spraying four times with a spore suspension of *Alternaria solani* were given seven treatments with ferbam, 65 per cent. ziram, copper oxychloride, copper oxide (all at 500 l. of a 0·5 per cent. suspension per ha.), copper oxychloride in tobacco powder (6·5 per cent. copper, 20 kg. per ha.), and dichloronaphthoquinone (500 l. per ha., 0·25 per cent. solution), the numbers of leaf spots expressed as percentages of those on the untreated were, respectively, 77·9, 45·1, 34·7, 39·4, 73·3, and 32·9; the corresponding figures for the numbers of tubers harvested were 108, 125, 109, 98, 121, and 100, and tuber weight 120, 130, 122, 97, 114, and 121.

Hanna (A. D.) & Nicol (J.). **Application of a systemic insecticide by trunk implantation to control a mealybug vector of the Cacao swollen shoot virus.** - *Nature, Lond.*, 173, 4407, pp. 730–731, 1954.

In a joint experiment on the control of *Pseudococcus njalensis*, the mealybug

vector of the cacao swollen shoot virus [*R.A.M.*, 33, p. 218], by Pest Control, Ltd., and the West African Cacao Research Institute, Tafo, Gold Coast, trees harbouring a reasonable population were injected with dimefox (bis-dimethylamino fluorophosphine oxide) [31, p. 425] at 75, 150, 225, and 300 p.p.m. of the weight of the aerial part of the trees, through holes 3·5 in. deep bored in the trunks at ground level at an angle of 45° by means of a pneumatic drill. The holes were then plugged and sealed with a pliable antiseptic wax.

Six weeks after treatment the trees were felled and the surviving mealybugs counted. There was an overall average of 3,770 on the untreated trees; only four had less than 100. Dimefox at all strengths reduced the populations, including those on the pods where the insects tend to congregate; 225 p.p.m. resulted in an average of four mealybugs per tree and 300 p.p.m. in one. Therefore, under the conditions of the experiment 250 p.p.m. should be satisfactory for complete control and 160 p.p.m. if the pod population is ignored.

Further experiments are in progress to determine the effect of continuous insecticide application on tree growth and yield.

Malaguti (G.) & Sirotti (L.). **Podredumbre de la corteza de los Bucares (Erythrina spp.) y del Cacao (Theobroma cacao) en Venezuela.** [Bark rot of Bocare (*Erythrina* spp.) and Cacao (*Theobroma cacao*) in Venezuela.]—*Agron. trop., Maracay*, 2, 1, pp. 41–53, 4 figs., 1 graph, 1 map, 1952. [English summary.]

Cacao, *Erythrina micropteryx*, and *E. glauca* trees in the Barlovento and central and eastern areas of Venezuela are attacked by a fatal bark rot caused by *Calostilbe striispora*, the symptoms of which agree with those described in Trinidad [cf. *R.A.M.*, 20, p. 453]. In general, cacao suffers the greater damage as it is shaded chiefly by *Erythrina* spp. A survey of 4,500 ha. in the Aragüita, Caucagua, and Tacarigua regions of Barlovento, the principal cacao area in Venezuela, revealed that approximately 7 per cent. of the shade trees, of which 64 per cent. are *Erythrina*, will soon be lost. On the Altagrecia estate, near Caucagua, where *Erythrina* comprises 97 per cent. of the total shade, 18·7 per cent. of the trees attacked were *E. glauca* and 50 per cent. *E. micropteryx*. Two specimens of *Enterolobium cyclocarpum* were affected in Aragua.

The average ascospore measurements, 42·6 by 10·9 μ, were smaller than those cited by Baker [loc. cit.]. The pathogenicity of *C. striispora* to *Erythrina* and cacao was established by inserting pieces of diseased bark or pure cultures of the fungus into healthy trees. Under conditions favourable to the disease *Erythrina* trees die within ten to 12 months.

Overland (A.) & Nelson (W. L.). **Germination tests with commercial lots of Wheat seed treated with copper carbonate.**—*Plant Dis. Reptr*, 38, 1, pp. 25–26, 1954. [Multilithed.]

The results of germination tests with treated winter and spring wheat seed at Washington Agricultural Experiment Station, Pullman [*R.A.M.*, 33, p. 287], indicate that fungicides should be tested more thoroughly before new methods of application are recommended. Copper carbonate slurry, assumed to be non-toxic like the corresponding dust treatment, proved injurious, particularly at low temperatures.

Harrington (J. B.). **Cereal breeding procedures.**—*F.A.O. Developm. Pap.* 28, vii+122 pp., 14 diags., 1952.

The author deals with the practical aspects of a breeding programme for wheat, rice, and other small grains, describing in detail the methods of recording and manipulating large populations of selections and hybrid material in successive genera-

tions, the testing of these in the field and glasshouse, and the mechanics of numerous other operations of importance in cereal breeding.

A section of the chapter on nursery testing (pp. 55–75) is devoted to rust nurseries. Black stem rust (*Puccinia graminis*) of wheat, oats, and barley is dealt with in detail to illustrate testing procedures, leaf rust of wheat (*P. triticina*) and oats (*P. coronata*) and flax rust (*Melampsora lini*) also being covered. Other sections deal similarly with smut nurseries, with special reference to wheat bunt (*Tilletia tritici*), oat smuts (*Ustilago avenae* and *U. levis* [*U. kolleri*], covered smut (*U. hordei*) of barley, and loose smut of wheat (*U. tritici*) and barley (*U. nuda*), and with nurseries for other diseases, including common root rot of wheat, oats, and barley (*Helminthosporium sativum* and *Fusarium culmorum*) and other seed- and soil-borne organisms of a semi-saprophytic nature.

VASUDEVA (R. S.), LELE (V. C.), & JOSHI (L. M.). **Occurrence of physiologic races of Wheat rusts in India during 1949–50.**—*Indian Phytopath.*, 5 (*1952*), 2, pp. 63–65, 1953.

Wheat rust samples collected from the 1949–50 crop in India [*R.A.M.*, 32, p. 179] were analysed at the Rust Research Sub-station at Simla with the following results. From 64 collections of black rust (*Puccinia graminis tritici*) [33, p. 221 and following abstracts], 62 from wheat and two from barley, races 21, 42, and 40 were encountered 46, 15, and 13 times, respectively, and race 34 once. Races 21 and 42 were the most widely distributed; 15, once the most prevalent, has become rare.

In 19 collections of wheat brown rust (*P. triticina*) [loc. cit.] races 63, 20, 108, and 11 were found 12, 8, 3 and 2 times, respectively, and races 10, 26, and 106 once each.

In 29 collections of yellow rust (*P. glumarum*) [33, p. 221], 24 from wheat and five from barley, races 19, 'A', and 31 were found 11, 8 and 3 times, respectively, races 'G' and 'H' twice each, and races 13, 20, and 'E' once each. Race 19 was widely distributed. The barley collections from Punjab yielded races 19 and 'G', those from Uttar Pradesh 13 and 19.

PRASADA (R.) & LELE (V. C.). **New physiologic races of Wheat rusts in India.**—*Indian Phytopath.*, 5 (*1952*), 2, pp. 128–129, 1953.

Two new races of *Puccinia graminis tritici* [see preceding and next abstracts], provisionally designated A and B, have now been given international numbers 194 and 117, respectively. The latter is closely related to races 53 and 119. The new race, D, of *P. triticina* [loc. cit.] has been identified as a biotype of race 11.

GOKHALE (V. P.) & PATEL (M. K.). **Effect of stem rust, particularly on grain weight, of some improved Indian Wheats.**—*Indian Phytopath.*, 5 (*1952*), 2, pp. 89–103, 1 pl., 1953.

The relative susceptibility of nine improved wheat varieties to stem rust (*Puccinia graminis tritici*) [see preceding abstracts] in terms of loss of grain weight, was studied in tests made at Mahableshwar from 1950 to 1952 with ten Indian physiologic races. All the tested varieties are highly susceptible to all or many races in the seedling stage.

The varieties can be grouped according to the severity of infection at different stages of growth: (*a*) highly susceptible at all stages, rapid development of infection, leaf blades highly susceptible, loss in grain weight nearly 100 per cent.: A.103 and Motia; (*b*) less susceptible between seedling and heading than later, leaf blades less susceptible, but grain loss nearly that of (*a*): A.115 and Mondhya 3–2; Niphad 4 was more resistant, with a loss of 72 per cent. in 1950–1 and 65 per cent. in 1951–2; (*c*) less severely rusted than previous groups (tolerant): N.P.114–3–2, N.P.710, and

N.P.715 (all 30 per cent. loss), and N.P.52 (50 per cent.). The percentage reduction in the number of grains per ear (as compared with healthy plants) was above 90 in A.013 and Motia, above 40 in A.115, and ranged from 13 to 20 in the other varieties.

Recommendations include the elimination of susceptible varieties, the use of tolerant varieties in hybridization, cultivation of tolerant ones where resistant are not available, and sulphur dusting [*R.A.M.*, 33, p. 286] during epidemics.

Duff (A. D. S.). **Seedling resistance and mature-plant susceptibility of Wheat to Puccinia graminis found in Kenya.**—*Nature, Lond.*, 173, 4408, p. 779, 1954.

Although seedling and mature-plant resistance to *Puccinia graminis* in wheat have been shown in the past to be independent, work at the Plant Breeding Station, Njoro, Kenya [cf. *R.A.M.*, 33, p. 214], has demonstrated hitherto that the selection of resistant seedling lines has resulted in mature-plant resistance [cf. next abstract]. Recently, however, the plants of some lines resistant as seedlings have been found susceptible in the field, namely Kenya 184 and 318 and D.C. × Ceres R.46.

Rohde (C. R.). **A study of the inheritance of the reaction to leaf rust and other characters in triangular Wheat crosses.**—*Diss. Abstr.*, 13, 6, p. 961, 1953. [Mimeoprinted. Received May, 1954.]

In studies at the University of Minnesota the inheritance of field resistance to leaf rust [*Puccinia triticina*: *R.A.M.*, 32, p. 369] in a cross between the spring wheats Mida and 11–42–22 was explained on the basis of a single factor pair (L). Another single factor pair (f) controlled seedling resistance to races 5, 9, 15, 52, and 126; two (g and g_2) governed reaction to race 9, to which Mida is resistant, and also to race 58. Linkages between f, g, and L were indicated. In a Mida × Frontana cross field reaction to a collection of races was explained on the basis of three factors (A and A_2 in Frontana) with any two giving complete resistance. Seedling resistance to races 52 and 58 was attributed to the two factor pairs H, H_2 and J, J_2, respectively, and that to race 9 to the single factor i. Reactions to races 5 and 15 were controlled by factors different from those determining resistance to race 52. The reactions to races 5, 15, 52, and 58 were associated and each was associated with A and A_2. Associations were also observed between i, HH_2, and AA_2. The cross Frontana × 11–42–22 appeared to substantiate the hypotheses made from the other two crosses.

The inheritance of field reaction to a collection of races of stem rust [*P. graminis*: 32, p. 244; cf. preceding abstract] in two crosses involving 11–42–22 appeared to involve two factor pairs. In Frontana × 11–42–22 the field reaction was associated with the seedling reaction to race 15 and with the field reaction to a collection of races of *P. triticina*.

Three new small grains for Texas.—*Seed World*, 73, 12, p. 31, 1953.

Two new fodder wheat varieties, Bowie and Travis, resistant to the new and virulent races of leaf [brown] rust [*Puccinia triticina*: *R.A.M.*, 33, p. 288] and stem rust [*P. graminis*: loc. cit. and next abstract] in Texas, are to be made available in 1955 by the Texas Station and the United States Department of Agriculture.

New Wheats resistant to 15 B rust.—*Seed World*, 73, 12, p. 39, 1953.

Two new wheat varieties resistant to race 15 B of stem rust [*Puccinia graminis*. see preceding abstract], C.T.186 developed in Canada and Ns3880 at the North Dakota Agricultural College, produced average yields of 32·5 and 27·8 bush. per acre, respectively, in 1953 when rust damage was very heavy. It is hoped that they will be released for general distribution in 1955.

Rodenhiser (H. A.) & Holton (C. S.). **Differential survival and natural hybridization in mixed spore populations of Tilletia caries and T. foetida.**—*Phytopathology*, 43, 10, pp. 558–560, 1953.

In inoculation experiments with mixed spore inoculum on the susceptible Ulka wheat variety from 1940 to 1946, inclusive, at the Idaho and Montana Agricultural Experiment Stations, races L–2 and L–8 of *Tilletia foetida* were generally better able to survive in competition with the nine 'T' races of *T. caries* [*R.A.M.*, 25, p. 209; 33, p. 342]. In some mixtures spores of the former predominated after the first passage through the host, while in others two or more passages were needed to produce the same effect. Exceptions were T–1, T–4, and T–7, of which T–1 was the most predominant in competition with the L races. There appears to be no explanation for these differences, though spore germination rate may be at least a contributory factor in some cases.

Ample opportunity is available for the occurrence of natural hybridization in mixed spore populations. Hybrids produced in this manner may give rise to lines of a more aggressive propensity than the parent stock. In these investigations, for instance, the hybrid spores of one mixture (L–8+T–3) predominated in the population after seven passages through the host.

Priefer (H.). **Verhütung von Weizensteinbrand und Fusskrankheiten.** [Prevention of Wheat bunt and foot rots.]—*Mitt. dtsch. LandwGes., Frankfurt*, 68, 41, pp. 1046–1047, 1953.

In seed disinfection experiments at Hildesheim, Germany, in 1952–3 for the control of bunt (*Tilletia tritici*) [*T. caries*] on Carstens VI winter wheat, the incidence of the disease in the untreated plots was rated at 7 per cent. and in those treated with (*a*) standard fungicides and (*b*) tritisan (containing chloronitrobenzene) [*R.A.M.*, 31, p. 547; 33, p. 289] at 10 and 0 per cent., respectively.

Foot rots [*Ophiobolus graminis* and *Cercosporella herpotrichoides*: 32, p. 269; 33, p. 205] were also effectively combated in the plots sown with tritisan-treated seed, the percentage of diseased stubble being 7·6 compared with 30·5 and 29·1 for the standard fungicides and untreated, respectively.

Slykhuis (J. T.). **Striate mosaic, a new disease of Wheat in South Dakota.**—*Phytopathology*, 43, 10, pp. 537–540, 3 figs., 1953.

Wheat striate mosaic, a hitherto unknown virus disease, was observed during the winter of 1950–1 on winter and late spring wheat in South Dakota [*R.A.M.*, 33, p. 285]. The first symptoms appear principally on the lower leaf surface. Necrosis may be severe. Affected plants have partially sterile heads and poor-quality grain, or they may die before heading. The minimum latent period of the virus in nymphs and adults of the leafhopper *Endrica inimica* ranged from 10 to 14 days. Some individuals transmitted the disease only once, others repeatedly during their lifetime. By the end of the maximum latent period of 31 days 65·2 per cent. of the surviving leafhoppers had transmitted the virus at least once. The incubation period in the host ranged from 15 to 45 days, usually 25 to 35 at greenhouse temperatures fluctuating between 65° and 80° F. with a mean of 68°.

Minter and Nebred, the two most widely cultivated winter wheat varieties locally, proved highly susceptible to striate mosaic in both greenhouse and field inoculation experiments. Rushmore, Lee, and Exchange developed well-defined streaks over the leaf veins, while the symptoms on Mindum, Capelli (*Triticum durum*), and Vernal (*T. dicoccum*) were more reminiscent of the blotchy chlorosis associated with wheat streak mosaic [wheat mosaic virus: loc. cit.]. In the later stages of infection on Hope, Henry, and Frontana the characteristic features of striate mosaic were replaced by a brown, necrotic speckling with areas of necrosis

resembling the advanced phase of the disease on Minter. Mild, chlorotic dashes and streaks of striate mosaic appeared on Chevron barley and Clinton oats after viruliferous *E. inimica* had fed on them in the greenhouse, while natural infection was contracted in the field by *Eragrostis cilianensis* and *Panicum capillare* and transmitted from them to wheat by the leafhoppers.

ROANE (C. W.), STARLING (T. M.), & MCKINNEY (H. H.). **Observations on Wheat mosaic in Virginia.**—*Plant Dis. Reptr*, 38, 1, pp. 14-18, 1954. [Multilithed.]

In 1953 trials were carried out in Westmoreland county, Virginia, to determine reactions and yield of certain tester varieties and resistant wheat selections, including some recommended for farm use, in mosaic-infested soil [*R.A.M.*, 32, p. 674 and next abstract]. Mosaic rosette virus (wheat mosaic virus) was present, causing characteristic rosetting in Harvest Queen. Very high infection percentages and severe reactions were obtained. Illinois Sel. 36–686, which possesses the highest type of field resistance to the soil-borne wheat mosaic viruses so far encountered, developed mosaic for the first time in the field. Several other varieties, previously regarded as highly resistant or tolerant, showed an unusual amount of infection, but in comparison with highly susceptible ones they retained their relatively high position for resistance. A good correlation between resistance and yielding ability on virus-infested soil was obtained with test varieties adapted to Virginia conditions; Nudel, Y2375, C.I.12651, V.P.I.131, and C.I.12985 gave the highest yields, but in the absence of the virus they were outyielded by other varieties.

MOSEMAN (J. G.), MCKINNY (H. H.), & ROANE (C. W.). **Reaction of Wheat varieties and selections to the soil-borne viruses in southeastern United States.**—*Plant Dis. Reptr*, 38, 1, pp. 19–24, 1954. [Multilithed.]

A brief, tabulated account is given of the reactions of wheat varieties and selections, including most of those grown in south-eastern United States, to soil-borne mosaic viruses in trials during recent years in North Carolina [*R.A.M.*, 33, p. 291] and Virginia [see preceding abstract]. Of the varieties from the Southern Nursery, North Carolina, Chancellor was highly resistant at Statesville in 1949 and 1952, but showed severe infection in 40 per cent. of the plants at China Grove in 1953; Taylor and Anderson had a lower incidence in 1953 though reaction was severe; and Leap and Vahart were resistant in all tests. Among the varieties from the Uniform Wheat Mildew Nursery, used in breeding for resistance to *Erysiphe graminis*, Picardie, Suwon 92, C.I.12671, Progress, Normandie, F.W.806, and F.W.815 were highly resistant to mosaic in all tests, while Axminister, Asosan, Sturgeon, Huron, and C.I.12559 were resistant to the strains in North Carolina and showed some tolerance in Westmoreland county, Virginia. C.I.12660 was the most resistant of the varieties in the Uniform Winter Wheat Rust Nursery; Trumbull, Mediterranean, Wabash × American Banner, C.I.12885, C.I.12993, C.I.13083, C.I.12804, and C.I.12517 were resistant in North Carolina but susceptible, with moderate or severe reaction, in Virginia. Among breeding lines from the International Rust Nursery, Egypt Na 95, Gabo, Kenya Standard, Kenya 338.2C2.E2., and Supreme 51A were highly resistant.

HOFSTEN (C. G. v.). **Bleka fläckar eller prickar på bladen. En sjukdom på Vete som allt flera frågar om.** [Pale spots or specks on the leaf. A Wheat disease which is continually eliciting more inquiries.]—*Lantmannen, Uppsala*, 37, 40, pp. 909–910, 2 figs., 1953.

A pale spotting or speckling of wheat leaves, which was very prevalent on dry ground poorly supplied with nitrogen in central Sweden on the Odin, Aros, Skandia IIB, and Eroica varieties in the summer of 1953, has been observed for many

years and is variously attributed to physiological or hereditary factors or a virus infection. Although the annual crop reductions from the disorder do not exceed a small percentage—perhaps Kr. 8,000,000—of the Kr. 400,000,000 at which the total Swedish harvest is valued, further studies on its etiology would appear to be indicated.

MILLER (J. D.). **Variability and inheritance of reaction of Barley to certain races of stem rust.**—*Diss. Abstr.*, 13, 5, pp. 618–619, 1953. [Mimeoprinted. Received April, 1954.]

About 250 barley varieties and strains from the State breeding programme and the World Collection were studied at the University of Minnesota for the effect of temperature on reaction to race 15 B of *Puccinia graminis* [*R.A.M.*, 26, p. 388] in the seedling stage. There was not sufficient similarity between the reaction of these seedlings and that of wheat to permit the complete adoption of the standard wheat reaction types. The barley seedlings did not produce 'green islands' characteristic of type 2 in wheat and there was considerably more chlorosis round the large pustules. At higher temperatures there was a tendency towards greater susceptibility, but there appeared to be better differentiation (by pustule size) between susceptibility and resistance. Both seedling and adult reaction at high or low temperatures were significantly related to adult reaction in the field. Minnesota 615 and Kindred [31, p. 485] were resistant or moderately so; Montcalm was susceptible. One factor pair (Tt) appeared to condition the reaction of barley to race 15 B with resistance dominant. There are adequate sources of resistance in the World Collection.

Of 1,042 varieties from the Collection and 196 from the Minnesota programme, screened for resistance to race 59A, Black Hull-less(C.I. No. 666) was outstanding. Again there was a highly significant association between the seedling reaction of 1,238 varieties at high temperature and their adult reaction in the field. Rust prevalence on seedlings was not significantly correlated with that on adult plants in the field.

GOTO (S.). **Leaf diseases of Oats.**—*Diss. Abstr.*, 13, 6, p. 964, 1953. [Mimeoprinted. Received May, 1954.]

Disease surveys in Minnesota from 1948 to 1952 revealed the prevalence of various minor leaf diseases of oats including *Septoria avenae* [*Leptosphaeria avenaria*: *R.A.M.*, 33, p. 149], *Colletotrichum graminicola* [32, p. 76], *Helminthosporium* [*Pyrenophora*] *avenae* [33, pp. 71, 345; C.M.I. map No. 105], *Sclerospora macrospora* [*R.A.M.*, 31, p. 379; 33, p. 283], *Pseudomonas coronafaciens* [28, p. 116], *P. striafaciens* [24, p. 144], and mosaic viruses [32, p. 618] including red leaf disease [32, p. 553]. Recently, however, both red leaf and *L. avenaria* appear to have become more important.

Of 95 oat varieties and lines tested in the greenhouse with a pycnidial-forming isolate of *L. avenaria*, none was resistant or immune, neither was there any indication of high resistance in the field, though Clinton, Mo.0–205, Branch, Santa Fe × Clinton, Bonda, and Shelby seemed slightly less susceptible than Gopher, Mindo, Andrew, Vicland, Ajax, and James. Therefore, before an oat variety can be recommended as a resistant parent for use in an improvement programme, a wider search for sources of resistance to *L. avenaria* is necessary.

One collection of western wheat mosaic virus from wheat [32, p. 239] and another from oats were inoculated to seedling oat varieties and lines in the greenhouse. *Avena trispernia*, Garry, Saia, S. D. Hullness, Landhafer, and Santa Fe were highly resistant to both collections [cf. 32, p. 618]. Of 45 F_3 Santa Fe and 21 F_4 Landhafer derivatives tested, five and four lines, respectively, also showed good resistance.

It is suggested that with a concurrent search for other resistant parental stock, lines of oats in advanced generations resistant to crown and stem rust (*P. coronata* and *P. graminis*) [33, pp. 291, 344] should also be tested for resistance to *L. avenaria* and western wheat mosaic virus.

ROWELL (J. B.) & DEVAY (J. E.). **Factors affecting the partial vacuum inoculation of seedling Corn with Ustilago zeae.**—*Phytopathology*, 43, 12, pp. 654–658, 2 figs., 1 graph, 1953.

During the past two years a modification of the partial vacuum methods used by Wilkinson and Kent [*R.A.M.*, 25, p. 109] and Wallin [28, p. 391] for the inoculation of maize seedlings with *Ustilago zeae* [*U. maydis*] has been applied at the Department of Plant Pathology and Botany, University of Minnesota, in 14,967 pathogenicity and sexual compatibility tests with 2,482 isolates and mutants of the smut [see below, p. 440].

The coleoptile tip is cut from germinating seedlings before their immersion in the inoculum and subjection for five minutes to the maximum partial vacuum obtainable with a water aspirator. They are then planted and galls and chlamydospores normally develop within a fortnight, the optimum temperature for production being 85° F., with a progressive retardation at 70° and 60°. Essential factors for high percentages of infection are aseptic seedlings with a coleoptile 0·5 to 1 cm. in length, the tips to be cut to allow even penetration of the inoculum to the growing point and plumule, and a smut suspension with at least 1,000,000 cells per ml.

Differences in the amount of gall formation were determined quantitatively by calculating the percentage of gall tissue from the fresh weight of plants above the coleoptile and of the excised galls. The cross between the smut lines 104A and 17D4 [loc. cit.] consistently resulted in a larger percentage of gall tissue in infected plants at all inoculum levels than the two solopathogens, 410 qq and 410 n, the infections differing both qualitatively and quantitatively in the development rate, appearance of the galls, and anthocyanin production. These divergences could not be modified by varying the number of cells in the inoculum or by the use of different maize hosts. Moreover, mixtures of the four lines in every possible combination failed to effect a major change in the infection type, though generally tending to reduce severity.

STOREY (H. H.) & RYLAND (A. K.). **Resistance to the Maize rust, Puccinia polysora.**—*Nature, Lond.*, 173, 4408, pp. 778–779, 2 figs., 1954.

Further work on resistance to maize rust (*Puccinia polysora*) in East Africa [cf. *R.A.M.*, 33, p. 16] conducted by the East African Forestry Research Organization, Kikuyu, Kenya, demonstrated that in a susceptible variety uredosori were strongly developed about 14 days after inoculation with fresh uredospores. Some plants among ten lines in collections originating from Mexico and Colombia reacted with discrete, almost circular necrotic areas on the leaves, in which no sori developed or only minute ones with limited spore production. No material gave evidence of immunity. Of 12 progenies raised from selfed seed of the above lines, one gave 45 resistant plants (on the basis of seven tests), while the remaining 11 segregated into resistant and susceptible. When 13 resistant plants were crossed with susceptible ones one gave 28 resistant plants (four tests) and the rest segregated. There appears to be one major dominant gene for resistance and at least one other having a sufficiently powerful effect to be of possible value in breeding for resistance.

SURYANARAYANA (D.). **Infection caused by the oospores of Sclerospora graminicola (Sacc.) Schroet. on Pennisetum typhoides Stapf. and Hubbard.**—*Indian Phytopath.*, 5 (*1952*), 2, pp. 66–75, 4 pl., 1953.

Extensive losses to crops of *Pennisetum typhoides* are caused by *Sclerospora*

graminicola in India [*R.A.M.*, 11, p. 507]. Experiments were carried out at Agra from 1944 to 1948 on the importance of oospores in the transmission of the disease. Inocula obtained at Agra, Poona, and Coimbatore were stored (*a*) in the laboratory, (*b*) exposed to the atmosphere, and (*c*) in pots buried in the fields. The oospores remained infective for one to three years. Applied as inoculum in the soil they attacked the underground parts of the plant, whence infection spread upwards. The infection rate was low and erratic, the highest figure of 7·4 per cent. being obtained from material stored in soil; negative results were not infrequent.

Stewart (I.) & Leonard (C. D.). **Correction of molybdenum deficiency in Florida Citrus.**—*Proc. Amer. Soc. hort. Sci.*, 62, pp. 111–115, 1 fig., 1953. [Received May, 1954.]

Most of this information on the symptoms and treatment of molybdenum deficiency in citrus in Florida has been noticed from another source [*R.A.M.*, 32, p. 17]. Up to 0·4 oz. of sodium molybdate per mature tree may be necessary for spraying severe cases.

Knorr (L. C.), DuCharme (E. P.), & Busby (J. N.). **Discovery of exocortis in Florida Citrus.**—*Plant Dis. Reptr*, 38, 1, pp. 12–13, 1 fig., 1954. [Multilithed.]

The occurrence of citrus exocortis on *Poncirus trifoliata* [*R.A.M.*, 33, p. 24 and next abstract] was first noticed in Florida in 1952. The disease is believed to have been present in the State for some time, though undetected because trifoliate rootstocks are used mainly for Satsuma mandarins which appear to escape or resist infection.

In Uruguay a grower troubled with exocortis twenty years ago selected budwood only from bearing trees on *P. trifoliata* rootstocks showing no scaling or stunting; so far no symptoms have been observed on such trees.

Although the choice of citrus rootstocks tolerant of tristeza and adaptable to wet, heavy soils is critically limited, it is suggested, as a result of losses caused by exocortis, that *P. trifoliata* should be grown in Florida on a limited or experimental basis only until more is known about the disease, in both its latent and expressed forms, on local citrus varieties.

Bitters (W. P.), Brusca (J. N.), & Dukeshire (N. W.). **Exocortis transmission tests.**—*Calif. Agric.*, 8, 4, pp. 4–5, 12, 8 figs., 1954.

In studies on the effect of Eureka lemon budwood on the transmission of exocortis to rootstocks of trifoliate orange [*Poncirus trifoliata*: see preceding abstract], Morton citrange, and Troyer citrange in an experimental planting at Riverside, California, no symptoms appeared on unbudded seedlings of the three rootstocks and none on those budded to nucellar Frost Eureka lemon tops, indicating that the latter did not carry the disease and that it is not an inherent character in these rootstocks. Seedlings of the three rootstocks, inoculated with budwood from a severely affected Eureka lemon tree, the bud not being allowed to grow, became stunted but showed no visible symptoms of exocortis, whereas similar inoculation of four out of five *P. trifoliata* and one of five Morton citrange rootstocks which had Frost Eureka lemon tops produced typical bark symptoms, the stock-scion combination apparently being a more favourable host for the virus. Of the three rootstocks, Troyer citrange was the least and *P. trifoliata* the most susceptible to inoculation.

Joshi (N. V.) & Joshi (S. G.). **Experiments on the control of the 'band' disease of Areca Palms.**—*Sci. & Cult.*, 19, 8, pp. 387–391, 1954.

Investigations were carried out from 1944 to 1953 by the Maharastra Association

for the Cultivation of Science, Poona, India, on the areca palm 'band' disease [*R.A.M.*, 28, p. 124] of unknown etiology, which causes sterility of the trees in the Konkan tract of the Bombay State. In a series of manurial experiments in 1950–51 a basal dressing of copper sulphate or zinc sulphate (both at 30 gm. plus 30 gm. lime per tree) resulted in 100 per cent. recovery. In the 1951–52 season copper sulphate plus lime (both at 25 gm.) gave 90 per cent. recovery, but zinc sulphate plus lime at the same rate gave only 10 per cent. Control recommendations, for the present, include the addition of copper sulphate and lime to the usual organic manure.

Dadant (R.). **Le Caféier en Nouvelle-Calédonie. Ses maladies.** [The Coffee bush in New Caledonia. Its diseases.]—*Agron. trop., Nogent*, 9, 1, pp. 49–58, 13 figs., 1954.

In New Caledonia the diseases of coffee (mainly *arabica* and *robusta*) [*R.A.M.*, 32, p. 304] include *Cercospora coffeicola* [C.M.I. map No. 59], *Corticium koleroga* [No. 64], *Colletotrichum coffeanum* [*Glomerella cingulata*: see above, p. 412] (damage slight), *Hemileia vastatrix* [No. 5], *Thielaviopsis neocaledoniae* [*R.A.M.*, 29, p. 363], and *Fomes*, sp., causing root rot. Physiological disorders include die-back, due to unfavourable environmental conditions, and iron deficiency [cf. 18, p. 22].

Cercospora coffeicola is uncommon and does not appear to cause serious damage. *Corticium koleroga* affects mostly *Coffea arabica* and *C. moka* growing in humid conditions under excessive shade. Attacks occur only in the rainy season, during February and March, some bushes being completely defoliated. In view of the expense of spraying, plantings seriously affected should be put under better cultural conditions. To reduce infection by *H. vastatrix* under local conditions shade should be increased. Plantations in mountainous regions are almost completely resistant. Since *T. neocaledoniae* is purely a wound parasite and dead bushes bear numerous spores, control consists in eliminating damage to healthy bushes during cultural operations and pulling up and destroying all infected bushes. Foot rot (*Fomes* sp.) is rare in plantations in the plains, but prevalent in the mountains. It appreciably reduces the number of bushes in a plantation. The disease is common on *Albizzia lebbek* and *Leucaena glauca*, from which it passes readily to coffee. Growers are planting the resistant *Inga edulis* as a shade tree. Any ordinary control methods would be impracticable.

Of the physiological disorders, die-back, found only where shade is inadequate and the soil lacking in humus, occurs chiefly in the dry season. Iron deficiency affects only a very few plantations on coral soils near the eastern coast.

A. lebbek is attacked by *Ganoderma applanatum* [cf. 29, p. 592], not so far found on coffee locally [cf. 12, p. 285].

Allen (R. M.). **Occurrence of Verticillium wilt in Arizona.**—*Plant Dis. Reptr*, 38, 1, p. 36, 1954. [Multilithed.]

A survey of the cotton-growing areas of Arizona carried out in the summer of 1953 showed that 5·7 per cent. of the land planted with short-staple varieties is infested with *Verticillium albo-atrum* [*R.A.M.*, 33, p. 295]. The discrete-spot type of disease distribution, in which wilted plants appear in roughly circular areas, two to ten yards in diameter, on land in cultivation for the first year, the disease practically disappearing in the second and third years, was somewhat reminiscent of the 'fluctuating' occurrence of *V. albo-atrum* on hops [27, p. 584].

Anson (R. R.) & Barlow (K. C.). **Cotton breeding section. The Gezira Station.**—*Rep. Res. Div. Minist. Agric., Sudan, 1949–1950*, pp. 57–61, 1952. [Received 1954.]

Of 12 cotton varieties exposed to ideal conditions for leaf curl virus infection

[see above, p. 411], the most resistant were RDS.6/48 with 7·4 per cent. infection, RDS.4/48 (8), and BLR.14/1 (9·2), compared with an average of 97·7 per cent. on the susceptible Domains Sakel. Where blackarm (*Xanthomonas malvacearum*) [loc. cit.] was severe (at the Gezira Research Farm and Hag Abdulla) the resistant Sakel varieties outyielded the susceptible Domains Sakel, and the resistant L cottons were superior to X1730A; these results were reversed at Turabi, where incidence was light.

Muller (R.) & Chevaugeon (J.). **État actuel de la question du flétrissement bactérien du Cotonnier (black arm disease).** [Present state of the question of bacterial blight of Cotton (black arm disease).]—*Rev. Path. vég.*, 32, 2, pp. 61–72, 1953.

Summing up the information at present available on cotton blackarm disease (*Xanthomonas malvacearum*) [*R.A.M.*, 33, p. 229 and preceding abstract], the authors present a succinct account of the geographical distribution of the disease (stated to include Persia and Uruguay), its economic importance, its symptoms, the causal organism, transmission, the ecological and biological factors affecting infection, and control.

Drechsler (C.). **A nematode-capturing fungus with clamp-connections and curved conidia.**—*J. Wash. Acad. Sci.*, 44, 3, pp. 82–85, 5 figs., 1954.

Nematoctonus campylosporus n.sp., which captures various nematodes [cf. *R.A.M.*, 28, p. 627; 31, p. 16], was found in decaying vegetation from near La Place, Louisiana. It is characterized by hyphae 2 μ wide with clamp-connexions bearing occasional sterigmata 25 to 200 μ long and composed mainly of filiform segments. The distal one is naked at first but soon becomes enveloped in a globule of glutinous material which adheres to the nematode. Sterigmata, often arising dorsally from the clamp, are mostly 2 to 5 μ high, tapering upwards, and about 0·5 μ wide at the tip whereon a single conidium is borne. The conidia are colourless, allantoid, usually with marked curvature, and commonly measure 2·5 to 4 μ at the widest part and 10 to 13 μ along the curved axis.

Crandall (B. S.). **Jute stem canker in Cuba.**—*Plant Dis. Reptr*, 38, 1, pp. 37–38, 1 fig., 1954. [Multilithed.]

A severe stem canker, tentatively attributed to *Macrophomina phaseoli* [*R.A.M.*, 32, p. 188], affected one-month-old jute plants in 1952 and velvet beans (*Mucuna deeringiana*) in 1953 in Cuba. Under local conditions strain P1–190453 of *Corchorus capsularis* and all the 13 selections of *C. olitorius* under trial were resistant.

Flor (H. H.). **Epidemiology of Flax rust in the north central States.**—*Phytopathology*, 43, 11, pp. 624–628, 1953.

This is a tabulated report of the results of epidemiological surveys in the United States from 1931, when specialization in flax rust (*Melampsora lini*) was first demonstrated [*R.A.M.*, 17, p. 323], until 1951, inclusive [31, p. 489]. In the north-central area the races attacking widely grown varieties have increased, while those unable to do so have decreased. The predominant races have been those carrying the minimum number of recessive (virulent) genes that permit of survival [26, p. 489].

Bison, released as a rust-resistant variety in 1926, proved to be susceptible to each of the 570 races isolated from field collections of flax rust during the period under review. Between 1931 and 1940, when it was the dominant variety, 92 per cent. of the isolates consisted of races 1, 2, and 3. Race 1 carries no recessive genes for pathogenicity on the differential flax varieties, while 2 and 3 each possess a single

pair. A similar situation developed between 1942 and 1947 with Koto, which is susceptible to race 210, and with Koto and Dakota from 1948 to 1951.

During each period there was a decline in the percentage of isolates pathogenic to differential varieties, such as Abyssinian and Bombay, which have rust-conditioning genes lacking in commercial or experimental types. Hence it would appear that in the north-central States the possession of a maximum number of dominant genes may be an important factor in racial survival.

LELE (V. C.). **Study of physiologic races in Linseed rust (Melampsora lini (Pers.) Lev.).**—*Indian Phytopath.*, 5 (*1952*), 2, pp. 121–127, 1953.

Heavy losses are caused by rust (*Melampsora lini*) to linseed flax in India [*R.A.M.*, 32, p. 544 and next abstract]. The reactions of 25 rust collections from all over India from the 1945–46 and 1946–47 crops were studied at the Rust Research Laboratory, Flowerdale, Simla, on the 11 differential varieties listed by Flor [19, p. 655 and preceding abstract] and also on Argentine C.I.705–1, Bison, and Punjab C.I.20, obtained from Australia.

Four physiologic races were determined. They were different from any reported by Flor and though they showed certain similarities with Australian races [23, p. 437] there were sufficient differences for them to be considered distinct. Indian race I_1 resembles Australian A but differs in that it attacks J.W.S. I_2 is rare and is similar to but less virulent than I_3, though it attacks Bison which is immune from or very resistant to I_3. Race I_4 is similar to Australian F (found only on wild flax) but their reactions on J.W.S. are different. The linseed varieties Abyssinian, Kenya, Pale Blue Crimped, Ottawa, and Argentine C.I.462 are uniformly immune from all four Indian races; Bombay and Punjab are both susceptible; Williston Golden, Akmolinsk, J.W.S., and Williston Brown showed little differential response. This has limited the range of host differentials and indicates the need for including varieties not regularly listed and for additional trials to determine physiologic races.

LELE (V. C.). **Indian wild Linseed (Linum mysorens Heyne), a possible collateral host of rust of the cultivated Linseed (Linum usitatissimum L.) in the hills.** —*Indian Phytopath.*, 5 (*1952*), 2, pp. 144–145, 1953.

It is suggested that wild linseed might serve as a collateral host of flax rust (*M*[*elampsora*] *lini*) [see preceding abstract] in areas where linseed is cultivated in India. Though no infected wild linseed plants were found in 1950 in the Simla hills, the rust was successfully transferred from artificially infected wild seedlings to cultivated linseed at the Rust Research Institute, Simla.

KLINKOWSKI (M.). **Die Viruskrankheiten der Lilien.** [The virus diseases of Lilies.] —*Pflanzenschutz*, 5, 8, pp. 104–108, 2 figs., 1953.

The author's summary of up-to-date information on lily viroses is based on the relevant literature, references to which have appeared from time to time in this *Review*.

LIMASSET (M. P.). **Les maladies à virus du Dahlia.** [Virus diseases of Dahlia.]— *Jardins de France*, Sér. 7, 8, 2, pp. 33–43, 4 figs., 1954.

Most of this information on virus diseases of dahlia in France [*R.A.M.*, 32, pp. 144, 191, 679; 33, p. 11], the damage caused by them, and control work based on the principle of selection of healthy varieties has already been noticed in this *Review*. Cucumber mosaic virus [cf. 32, p. 80], appearing in the form of light mosaic, is not very serious, and most varieties are tolerant of it.

Young (R. A.). **Fungicide-insecticide mixtures in pre-planting corm treatments for control of bacterial scab of Gladiolus.**—*Plant Dis. Reptr*, 38, 1, pp. 55–56, 1954. [Multilithed.]

Experiments carried out in 1951 and 1952 at Oregon Agricultural Experiment Station, Corvallis, indicated that the amount of gladiolus scab (*Pseudomonas marginata*) [*Bacterium marginatum*: *R.A.M.*, 31, p. 119] is influenced by the prevalence of wireworms, which provide wounds through which infection occurs. A 30-second pre-planting dip in a mixture of new improved ceresan (2 lb.), 20 per cent. aldrin or heptachlor (2 lb.), and triton 1956B or Du Pont spreader-sticker ($\frac{1}{2}$ pt.) in 100 gals. water gave successful control of scab in a commercial planting in 1953. The inclusion in the mixture of aldrin and heptachlor significantly decreased disease incidence without any measurable deleterious effect on the plants.

Beaumont (A.). **Diseases of Azaleas.**—*Gdnrs' Chron.*, Ser. 3, 135, 3511, p. 156, 1954.

Leaf scorch (*Septoria azaleae*), known on imported azaleas (*Rhododendron indicum*) [cf. *R.A.M.*, 32, p. 422] in England since 1926, is readily controlled by Bordeaux mixture and other fungicide sprays. Defoliation of imported plants, due to carbon dioxide poisoning caused by tight packing and lack of ventilation during transport, is often observed in the absence of any fungi. *Exobasidium vaccinii* is the commonest disease on imported azaleas [cf. 31, p. 460].

Carnations under glass.—*Bull. Minist. Agric., Lond.*, 151, 34 pp., 10 pl. (2 col.), 4 diags., 1954.

The common diseases of glasshouse carnations and their control are described in a section (pp. 31–33) of this bulletin, where it is stated that carnation mosaic virus [cf. *R.A.M.*, 32, pp. 387, 580] and carnation yellows virus [loc. cit.] are common in Great Britain. On pp. 3–4 descriptions of suitable varieties include notes on susceptibility to disease.

Outbreaks and new records.—*F.A.O. Pl. Prot. Bull.*, 1, 12, pp. 188–189, 1953.

In fungicide tests for the control of carnation rust (*Uromyces caryophyllinus*) [*U. dianthi*] on the Ligurian Riviera, Italy [*R.A.M.*, 32, p. 561], 3 per cent. dithane Z-78 spray at intervals of 20 days from the end of June to November gave the best results [see below, p. 437] and left no residue on the plants.

Aragaki (M.), Murakishi (H.), & Hendrix (J. W.). **A ringspot virus disease of Panax.**—*Phytopathology*, 43, 11, pp. 643–644, 1 fig., 1953.

Since 1948 panax (*Polyscias guilfoylei*), used as a screen and hedge plant in Hawaii, has been affected by a graft-transmissible virus producing on the leaves concentric rings, with white centres and purplish-brown edges, and causing premature defoliation and stunting. No natural transmission was demonstrated, and careful selection of the vegetative cuttings used in propagation has made possible the establishment of a healthy hedge on the University campus.

Samuels (G.) & Cibes (H. R.). **Iron chlorosis on Dracaena sanderiana.**—*J. Agric. Univ. P.R.*, 37, 4, pp. 265–272, 1 fig., 1953. [Spanish summary.]

Dracaena sanderiana, grown as an ornamental in Puerto Rico for export to the United States, was severely affected in 1952 by iron chlorosis which threatened to limit or prevent production. The disorder, characterized by yellowing, chiefly of the younger leaves, occurred on soils ranging in pH from 4·2 to 7·5 and in texture

from loamy sand to heavy clay. It was particularly prevalent on poorly drained soil. Ferrous sulphate sprays caused spotting or uneven greening of the leaf and left an unsightly residue but Fe-EDTA (the ferric salt of ethylenediamine tetra-acetic acid) [*R.A.M.*, 32, pp. 429, 626] applied as a spray (1 lb. per 100 gals.) gave satisfactory improvement with no deleterious effects. It was also effective, but after a longer interval, when applied to the roots in solution. Highly chlorotic plants should be sprayed once a week for a month and then once a month until the chlorosis is under control. A spray every three months or soil application with the fertilizer at 25 lb. per acre is recommended for soils in which plants have shown chlorosis. Various cultural recommendations which may help in control are also made.

Patel (M. K.), Wankar (B. N.), & Kulkarni (Y. S.). **Bacterial leaf spot of Amaranthus viridis L.**—*Indian Phytopath.*, 5 (*1952*), 2, pp. 146–151, 1 fig., 1953.

This information on *Xanthomonas amaranthicola* on *Amaranthus viridis* has been noticed from a shorter version [*R.A.M.*, 32, p. 368].

Patel (M. K.), Kamat (M. N.), & Pande (C. B.). **A new leaf blight of Crossandra infundibuliformis Nees.**—*Indian Phytopath.*, 5 (*1952*), 2, pp. 130–139, 2 pl., 1 fig., 1953.

A severe leaf blight caused by *Colletotrichum crossandrae* n.sp. was observed in 1950 in Poona on aboli (*Crossandra infundibuliformis*), widely cultivated in India as an ornamental in market gardens near big cities. The main symptoms are brownish, depressed, necrotic areas, with a reddish, slightly raised margin. Severely affected leaves roll up, shrivel, and finally die, resulting in heavy defoliation.

At the Plant Pathological Laboratory at Poona a suspension of conidia was atomised on seedlings which had been stored for twelve hours in the moist chamber and were kept there for another 72 hours. After five days yellow spots appeared; after 13 days they darkened and coalesced into wider patches.

High humidity and temperatures of 25° to 30° C. favoured the development of the disease. The fungus grew and sporulated between 15° and 27°; spores germinated between 15° and 37°, the optimum being 25°.

The acervuli of *C. crossandrae* grow in clusters of different sizes and shapes, measuring 132 to 276 μ. The setae are irregular, septate, dark greenish-brown, and measure 97 to 147 by 3 to 5 μ; the conidiophores measure 12 to 28 by 3 to 6 μ; the conidia are pale rose coloured, gelatinous, unicellular, cylindrical or elongate, oval, sometimes slightly curved, and measure 18 to 29 by 1 to 5 μ.

Mazzani (B.) & Malaguti (G.). **Filoidia en Lochnera y Sesamum.** [Phyllody in *Lochnera* and *Sesamum*.]—*Agron. trop., Maracay*, 2, 1, pp. 59–63, 3 figs., 1952.

Since 1949 phyllody has been observed in wild and cultivated plantings of *Vinca rosea* in Venezuela in the states of Aragua, Carabobo, Barinas, Falcón, Anzoátegui, Sucre, and Monagas, and in Maracay on *Sesamum indicum*, *S. radiatum*, and on the progeny of matrocline diploids obtained by pollinating *S. radiatum* with *S. indicum*. The symptoms in general corresponded to those described on *S. indicum* in India [*R.A.M.*, 15, p. 396]. Three months after treatment for ten days at 42° C. *V. rosea* plants produced normal flowers, seed from which gave rise to healthy plants.

Roberts (D. A.), Fezer (K. D.), & Sherwood (R. T.). **Diseases of forage crops in New York, 1953.**—*Plant Dis. Reptr*, 38, 1, pp. 30–31, 1954. [Multilithed.]

This is a brief account of a survey of meadows and pastures in 23 New York counties in June and August, 1953. An estimate of losses due to various diseases

is given for each forage crop [cf. *R.A.M.*, 33, p. 156]. The biggest loss was due to *Kabatiella caulivora* on red clover, which reduced the first cutting by 4 per cent. and the second by 8 per cent.; some seed crops were a complete loss.

Graham (J. H.) & Sprague (V. G.). **The effects of controlled periods of high and low humidities on the development of purple leafspot of Orchardgrass.**—*Phytopathology*, 43, 11, pp. 642–643, 1953.

At the U.S. Regional Pasture Research Laboratory, State College, Pennsylvania, in February, 1953, 64 plants of a clone of orchard grass (*Dactylis glomerata*) susceptible to purple leaf spot (*Stagonospora maculata*) [*R.A.M.*, 32, p. 385] were sprayed with a spore suspension obtained from diseased overwintered foliage and placed in high and low humidity chambers for varying and intermittent periods of time in order to simulate conditions occurring in natural pastures.

The results obtained [which are given in detail] may explain the occurrence of purple leaf spot even during relatively dry periods. If the spores are splashed by rain on to healthy leaves and drying follows before penetration supervenes, the growth of the fungus will be arrested, only to be resumed, however, in the event of another period of high humidity within two days. Over much of the north-eastern region this moisture requirement is probably fulfilled on most nights during the growing season. Thus, (unpublished) measurements by V. G. Sprague have shown that a relative humidity of 100 per cent. frequently occurs in a forage plant cover for six hours or more at night even during dry periods. Two successive nights of high humidity suffice for moderate infection by *S. maculata*, while four would very likely cause epiphytotics equal to those consequent on a protracted moist spell.

Mühle (E.). **Über einen weiteren Fall gleichzeitigen Auftretens von Dilophospora spec. mit einem Nematoden.** [On a further case of the simultaneous occurrence of *Dilophospora* sp. with a nematode.]—*Phytopath. Z.*, 20, 3, pp. 311–314, 3 figs., 1953.

At the end of August, 1951, very lustrous galls, 3 to 9 by 1 mm., were observed on the leaves of *Calamagrostis villosa* and *C. arundinacea* growing in a damp forest glade near Schierke, Harz Mountains, Germany. They mostly followed the mid-rib, pushing it sideways, and two or three frequently occurred in close proximity. Many of the galls were discoloured, especially near the leaf base, the dark tint sometimes extending beyond the galls. The leaf blades were often rolled inwards and looped, adhering to the leaf sheath with their shrivelled tips. Inflorescences were seldom formed on diseased plants.

Ditylenchus graminophilus [*Anguillulina graminophila*] was abundant in the galls, together with numerous pycnidia and spores of *Dilophospora* (?) *alopecuri* [cf. *R.A.M.*, 30, p. 461], to which the above-mentioned discoloration was evidently attributable.

A similar instance of joint infection of *C. villosa* was noticed early in September in Upper Vogtland, and there appears to be no doubt of a direct connexion between the two partners, lending weight to the view that the plumed spore disease may be disseminated by nematodes.

Massenot (M.). **Contribution à l'étude des Tuburcinia graminicoles.** [A contribution to the study of graminicolous species of *Tuburcinia*.]—*Rev. Path. vég.*, 32, 2, pp. 103–114, 1 pl., 1953.

This annotated list of species of *Tuburcinia* [*R.A.M.*, 15, p. 117; 20, p. 598] causing leaf smuts of various grasses includes two new species, and also *T.* [*Urocystis*] *agropyri* [cf. 30, p. 472; 33, pp. 116, 183] on *Agropyrum* [*Agropyron*] *repens*

at Grignon (Seine-et-Oise) and on *Phleum nodosum* at Auron (Alpes Maritimes); *T.* [*U.*] *macrospora* on *Bromus erectus* [loc. cit.] at Thimert (Eure-et-Loir) and at Samoens (Haute-Savoie); and *T.* [*U.*] *occulta* on rye, near Coutances (Manche).

Sampson (Kathleen) & Western (J. H.). **Diseases of British grasses and herbage legumes.**— Second edition. xiii+118 pp., 9 pl., 19 figs., London, Cambridge University Press, 1954. 15*s.* net.

This comprehensive monograph [cf. *R.A.M.*, 20, p. 471] has been brought up to date, work since 1941 being included, the nomenclature revised, and also the text and illustrations, where necessary. Descriptions of some of the less well known parasites have been expanded. The bibliography (pp. 91–111) has been considerably enlarged to include relevant developments in foreign countries, particularly in the United States during the last ten years. The book is issued for the authors by the British Mycological Society.

Smith (J. D.). **Turf disease notes, 1953.**—*J. Sports Turf Res. Inst.* (formerly *J. Bd Greenkeep. Res.*), 8, 29 (3, 3), pp. 259 260, 1953. [Received April, 1954.]

Numerous puffballs (*Lycoperdon* spp.) were reported on golf and bowling club greens in Great Britain during the summer and early autumn, 1953. An association between puffball rings and 'dry patch' of turf was noted in many cases. *Ophiobolus* disease [*O. graminis* var. *avenae*: *R.A.M.*, 32, p. 435] was severe in many places and occurred for the first time on *Festuca rubra*. *Helminthosporium sativum* caused leaf blight of *Lolium perenne* [cf. 32, p. 629] on a newly sown football pitch; this also constitutes a new host record for the country. It was controlled by the application of a proprietary organo-mercury fungicide.

Smith (J. D.). **Fungi and turf diseases III. Fusarium patch disease.**—*J. Sports Turf Res. Inst.* (formerly *J. Bd Greenkeep. Res.*), 8, 29 (3, 3), pp. 230–252, 2 pl. (facing p. 272), 1 fig., 2 graphs, 1953. [Received April, 1954.]

The third of this series of articles [cf. *R.A.M.*, 32, p. 564] deals with the symptoms, distribution, cause, morphology, life history, factors favouring, varietal reaction to, and prevention and control of *Fusarium* patch, the most common disease of turf in the British Isles, caused by *Calonectria graminicola* [16, p. 468]. The strain described herein differs from those in Europe and North America in that the disease there develops primarily beneath snow cover, whereas in Britain the patches appear before the snow falls. Optimum growth of the fungus occurs at pH 6·6 to 6·9 in culture.

An unexpected outbreak in June, 1953, on experimental plots at the St. Ives Research Station, Bingley, Yorks., followed a 12-day period when the relative humidity was over 80 per cent. and the temperature exceeded 55° F. Outbreaks also occurred elsewhere in the country during this period. Most strains of perennial ryegrass [*Lolium perenne*] are resistant to *C. graminicola*.

The results of one year's control experiments on naturally and artificially infected turf (newly sown New Zealand Chewing's fescue [*Festuca rubra*], New Zealand brown top [*Agrostis tenuis*], and *Poa* spp.) demonstrated the effectiveness of the inorganic mercury fungicides [cf. 32, p. 131] in reducing incidence. In one test experimental fungicide MG.1 (containing malachite green) also stimulated growth. Bordeaux mixture plus malachite green (4:8:1) was also effective [see next abstract] and is recommended for general use as it is by far the cheapest material; $3\frac{1}{4}$ gals. of solution in a knapsack sprayer are sufficient to cover approximately 160 sq. yds. turf. It should be applied to the whole turf area every 7 to 10 days during dull weather or in the evening to avoid strong sunlight.

Smith (J. D.). **Corticium disease. A preliminary report on the comparison of fungicides for the control of the disease.**—*J. Sports Turf Res. Inst.* (formerly *J. Bd Greenkeep. Res.*), 8, 29 (3, 3), pp. 253–258, 1953. [Received April, 1954.]

Trials were conducted on turf plots of New Zealand Chewing's fescue (*Festuca rubra*) and New Zealand brown top (*Agrostis tenuis*) at St. Ives Research Station, Bingley, Yorks., during 1952 and 1953 to determine the relative efficiency of various British and American fungicides in controlling *Corticium* disease [*C.* ? *fuciforme*: *R.A.M.*, 16, p. 468; 31, p. 330]. Three applications of malachite green plus Bordeaux mixture at ten-day intervals [see preceding abstract] reduced incidence from 28 per cent. to nil. Merfusan and HgF1 (both a mixture of mercuric and mercurous chlorides) reduced incidence from 31 and 35 per cent. to nil. Tersan 75, puraturf, and crag 531 also reduced it to nil from 20, 16, and 18 per cent., respectively. All these results were secured in 1953 when the disease was more severe. In pure sowings New Zealand Chewing's fescue [loc. cit.], *F. ovina* (var. Pontefract), and *F. duriuscula* were moderately resistant in 1953, *F. rubra* (F.R.1) was resistant, and *Agrostis canina* (St. Ives and Nova) and New Zealand brown top completely so.

The disease was abundant on untreated turf plots and on those treated with compost, lime, superphosphate or combinations of these, slight on plots receiving lime and sulphate of ammonia, and absent from those given ammonium sulphate in combination with the other fertilizers.

Andrews (E. A.). **Seedling blights and root rot of forage grasses.**—*Diss. Abstr.*, 13, 6, p. 962, 1953. [Mimeoprinted. Received May, 1954.]

Pythium graminicola and *Helminthosporium sativum* were the principal pathogens isolated from the roots of crested wheatgrass (*Agropyron cristatum*) seedlings [*R.A.M.*, 28, p. 403] grown in soil naturally infested with seedling blight and root rot at the University of Minnesota. Both fungi caused severe seedling blight of *A. cristatum*, *A. smithii*, *Agrostis alba*, *Bromus inermis*, *Festuca rubra*, *Phleum pratense*, *Poa compressa*, *P. pratensis*, *P. trivialis*, and *Andropogon furcatus*. *Agropyron pauciflorum*, *Dactylis glomerata*, *Phalaris* sp., and *Elymus canadensis* were moderately susceptible to *Pythium graminicola* and completely so to *H. sativum*. *F. elatior* was only moderately blighted by both fungi and plants from one seed lot of *B. inermis* were not affected by either. There was no association between the germination percentage and the severity of seedling blight. It is suggested that nematodes may predispose plants to root rot in the field.

P. graminicola does not appear to survive long in rotted root tissue when other fungi are present. *Fusarium* sp., *H. sativum*, and *Rhizoctonia* sp. (in that order) were recovered most frequently from seedling roots in artificially infested soils.

Seed treatment with new improved ceresan at ½ oz. per bush. and new improved ceresan jr, arasan, phygon, and spergon at the maximum amount of dust the seed surface would hold controlled pre- but not post-emergence seedling blight. The forage strain of *A. cristatum* was injured more severely than the Fairway strain by root rot occurring naturally at St. Paul. Strains of *A. cristatum* resistant to seedling blight were 'selected' by subjecting plants from eight seed lots to an artificial epidemic of both fungi and harvesting seed from the survivors. Plants from the 'selected' seed were more resistant when tested in steamed soil infested with *H. sativum* than plants from 'non-selected' seed, but were not resistant to *P. graminicola*.

Govindu (H. C.) & Thirumalachar (M. J.). **Ephelis on Sorghum halepense in Mysore.**—*Science*, 119, 3087, pp. 288–289, 1 fig., 1954.

Sorghum halepense growing in a field in Mysore, India, was severely attacked by a species of *Ephelis* [cf. *R.A.M.*, 32, p. 487], 40 per cent. infection being present in small areas. The conidia measured 13 to 23 by 1 to 1·5 μ.

Thirumalachar (M. J.) & Pavgi (M. S.). **Some new or interesting Physoderma species from India.**—*Bull. Torrey bot. Cl.*, 81, 2, pp. 149–154, 6 figs., 1954.

Culms of *Cynodon dactylon* plants growing in low-lying areas near Banares, U[ttar] P[radesh], submerged from July to September, were found to be infected by *Physoderma graminis* [cf. *R.A.M.*, 31, p. 285], resulting in severe stunting and malformation. Infected plants, however, produce normal inflorescences and spikelets. This constitutes a new record for India.

In the same locality *P. dichanthicolum* n.sp. produced elongated to fusiform leaf spots, reddish-green at first and later dark brown, 2 to 5 mm. long and 1 to 2 mm. wide, particularly on the basal leaves of *Dichanthium annulatum*, an important forage grass. The reddish-brown, hemispherical, smooth sporangia, flattened on one side, measure 24 to 45 by 17·5 to 31·25 (average 30 by 22·2) μ. Germination was not observed. Two other species are described, one new.

Lebeau (J. B.) & Dickson (J. G.). **Preliminary report on production of hydrogen cyanide by a snow-mold pathogen.**—*Phytopathology*, 43, 10, pp. 581–582, 1953.

The unidentified low-temperature basidiomycete responsible for winter crown rot of lucerne and other forage crops in Western Canada [*R.A.M.*, 31, p. 52; 32, p. 258] produces on both natural and synthetic media hydrogen cyanide in concentrations sufficient to kill the buds and crown tissue. The greatest production was obtained on media composed of soil and soy-bean meal and soil and lucerne crown tissues at temperatures round 4° C., with a sharp fall at 16° to 20°, which was near the maximum for the growth of the fungus.

The results of these preliminary experiments strongly suggest that the development of the disease is directly dependent on hydrogen cyanide production by the fungus when it is confined in close proximity to the plant, causing the destruction of specific tissues or the entire crown.

Benedict (W. G.). **Stemphylium leaf spot of Alfalfa in Ontario.**—*Plant Dis. Reptr*, 38, 1, pp. 27–29, 4 figs., 1954. [Multilithed.]

Pleospora herbarum caused considerable defoliation of three-year-old lucerne plants [*R.A.M.*, 20, p. 306; 24, p. 42; 33, p. 357] in test plots at the Science Service Laboratory, Harrow, Ontario, in 1953 and was prevalent in Essex county, occurring sparsely in Huron county. The outbreaks were probably associated with a prolonged period of hot, humid weather.

Davis (R. L.). **A study of the inheritance of resistance in Alfalfa to common leaf spot.**—*Agron. J.*, 43, 7, pp. 331–337, 1 fig., 1951.

At the Department of Agronomy, Purdue University, Lafayette, Indiana, two lucerne plants resistant to leaf spot (*Pseudopeziza medicaginis*) [*R.A.M.*, 33, p. 32 and next abstract] and four susceptible were crossed in all possible combinations, including reciprocals. The F_1 progeny and the S_1 were inoculated in the greenhouse and rated in classes 1 to 5 according to the type and degree of infection. The first two classes, represented by non-sporulating lesions, were classified as resistant, while the third, with both non-sporulating and sporulating, and the fourth and fifth, with the latter only, were considered susceptible. Of the two resistant clones, 1699 was more so than 1705—nearly homozygous, in fact, for the factors conditioning resistance.

The results of inoculation of 128 F_1 and 26 S_1 progenies selfed were such as to be expected if reaction to leaf spot is governed by a number of genetic factors, with the possible interaction of environmental conditions, e.g., temperature. The F_2 and S_2 were inoculated during the summer months, when the temperature was at least 15° higher than in the corresponding winter tests on the F_1 and S_1. When the F_2

population from plants rated 3 to 5 was inoculated during the high-temperature period there was a shift towards resistance, the extent of which was influenced by the genotype of the selected F_1 parents. The correlation coefficients between the means of the selected F_1 progenies and the respective F_2 means from the plants rated 3 and 4 were +0·809 and + 0·811, respectively.

The prepotency of clone 1699 persisted in the F_2, indicating that it transmits the genetic factors for homozygous resistance to its descendants, irrespective of the generation.

Jones (F. R.). **Measurement of resistance in Alfalfa to common leaf spot.** —*Phytopathology*, 43, 12, pp. 651–654, 1953.

Lucerne plants resistant to common leaf spot (*Pseudopeziza medicaginis*) have been found within several varieties, e.g., Narragansett, Grimm, Ranger, and Buffalo, and at the Department of Plant Pathology, University of Wisconsin, this character was studied in populations derived from selfing and crossing such individuals [see preceding abstract]. A rapid method of estimating resistance was devised, involving the observation of the stage of growth of the pathogen seven or eight days after inoculation, the leaves being decolorized by boiling in equal parts of glacial acetic acid and absolute alcohol. By this procedure three groups of plants may be recognized, namely, (1) completely susceptible, in which the initial spread of the parasite is through the epidermal cells; (2) intermediate, characterized by very slow spread in the epidermis, often accompanied by conspicuous distortion of the fungal elements; and (3) most resistant, with no infection of the epidermal cells but any surviving germ-tube passes directly into the mesophyll, where a densely packed mycelium may develop very slowly without eventual fruiting.

Powell (D.). **An evaluation of copper 8-quinolinolate as a fungicide against some pome fruit diseases.**—*Plant Dis. Reptr*, 38, 2, pp. 76–79, 1954. [Multilithed.]

In field trials carried out over several years by the Division of Plant Pathology, University of Illinois, Urbana, bioquin 1 [*R.A.M.*, 32, p. 476] applied to apples was excellent against bitter rot (*Glomerella cingulata*) [32, p. 26], fly speck (*Leptothyrium pomi*) [33, p. 338], and sooty blotch (*Gloeodes pomigena*) [loc. cit.; 32, p. 631] and good against scab (*Venturia inaequalis*) [33, p. 302] and blotch (*Phyllosticta solitaria*) [32, p. 26]; on pear it gave good control of *Fabraea* leaf spot (*F. maculata*) [28, p. 38].

At $\frac{1}{4}$ lb. per 100 gals. bioquin 1 is considered to be absolutely safe; at $\frac{1}{2}$ lb. it was non-injurious in these tests but might cause slight fruit russet on Golden Delicious apples under some climatic conditions.

Palmiter (D. H.). **Rust diseases of Apples and their control in the Hudson Valley.** —*Bull. N.Y. St. agric. Exp. Sta.* 756, 26 pp., 1 col. pl., 6 figs., 1 diag., 6 graphs, 1952. [Received 1953.]

The life-histories of the three common apple rust fungi, *Gymnosporangium juniperi-virginianae*, *G. globosum*, and *G. clavipes* [*R.A.M.*, 32, p. 489], are briefly reviewed and the disease symptoms they cause on apple and red cedar (*Juniperus virginiana*) are described. In field tests carried out in the Hudson Valley from 1941 to 1949 fermate, used alone at 1 or 1½ lb. per 100 gals. water, or at ½ lb. with 3 lb. sulphur in the regular apple sprays, consistently gave satisfactory control of both *G. juniperi-virginianae* and *G. clavipes*. On apple varieties such as Wealthy, Jonathan, Rome Beauty, and Golden Delicious, which are more susceptible to *G. juniperi-virginianae* than to scab (*Venturia inaequalis*) [loc. cit.] it is possible to control both diseases with fermate 1–100. Sulphur-fermate (4–¾–100) gave improved control of scab and *G. clavipes* on McIntosh. Combinations of fermate with

tag, puratized agricultural spray, and dynacide were used experimentally with good results.

KIRKHAM (D. S.). **Significance of the ratio between the water-soluble aromatic and nitrogen constituents of Apple and Pear in the host-parasite relationships of Venturia species.**—*Nature, Lond.*, 173, 4406, pp. 690–691, 1954.

Cultural studies at East Malling Research Station demonstrated that the aromatic fraction of the water-soluble constituents of apple and pear leaves, i.e., the complex mixture of plant phenols extracted by ethyl acetate, and the separate main components, may be strongly inhibitory to the growth and sporulation of *Venturia inaequalis* and *V. pirina* [cf. *R.A.M.*, 33, p. 243], depending on the complexity and amount of the nitrogen source. However, a high level of amino nitrogen in the culture medium may result in complete degradation of the aromatic compounds by exogenous activity of a polyphenol-oxidase system secreted by the fungus [cf. 32, p. 134]. Conversely, an inorganic or low-level amino nitrogen supply favours the inhibitory activity of the aromatic compounds, all stages from reduction in sporulation to complete inhibition of growth being secured. Marked differences in reaction to a given aromatic nitrogen ratio have been observed between different clones of each pathogen.

Shoots of potted apple and pear trees inoculated by spraying with conidial suspensions were injected in the petioles during the incubation periods with the aromatic fraction of leaf extracts and urea. Scab expression was recorded by estimating the percentage cover by lesions on both leaf surfaces. Water injection had no effect on scab incidence, the total scab 28 days after inoculation being 56·3. Following injection of the aromatic fraction of Cox's Orange Pippin leaf extracts at 1 per cent., the figure was 3·3; for the same plus 0·5 per cent. urea it was 54·3, and for urea alone 102·1. Mature leaves of all varieties are immune from infection. The injections had the greatest effect on leaves approaching maturity.

BLUMER (S.). **Der Schorf und seine Bekämpfung im Jahre 1952.** [Scab and its control in the year 1952.]—*Schweiz. Z. Obst -u. Weinb.*, 62, 7, pp. 125–126, 1953.

Weather conditions in the Zürich district of Switzerland during the critical periods for the development of apple scab [*Venturia inaequalis: R.A.M.*, 32, p. 260] were not altogether favourable, and primary infections on young fruits were seldom observed. At Wädenswil Experiment Station the incidence of fruit scab on two untreated Gravensteiners was 38 per cent. and on sprayed trees nil. On Golden Delicious the percentages of leaf and fruit infection were 31·6 and 47·4, respectively, which were reduced by spraying to 0·3 to 7·6 and 0 to 0·1, respectively. A more severe outbreak at Oeschberg resulted in 57 per cent. leaf infection on Gravensteiner and 70·8 per cent. on Golden Delicious, which was reduced to between 0·5 and 14 per cent. on sprayed trees of the two varieties.

All the fungicides tested gave satisfactory results: they were M555, organol, pomasol, tiurax (all of which had effectively controlled more virulent attacks in 1951) [31, p. 67], flit 406 (an American preparation marketed in Switzerland under the name of M1001) [see above, p. 405], and sporex (Siegfried).

Black end of Pears.—*J. Dep. Agric. Vict.*, 52, 4, p. 168, 1954.

Black end [*R.A.M.*, 30, p. 405] occurs in Victoria on a small proportion of trees of the common commercial pear varieties on Keiffer stocks. If the condition is serious the trees may be worked over to Winter Nelis which is only slightly affected. At Scoresby Horticultural Research Station experiments to discover the cause and prevention include grafting scions from healthy trees on root cuttings from affected ones, top-working scions from diseased trees on Winter Nelis seedlings and occasion-

ally top-working again with a commercial variety, and growing other trees on a strain of *Pyrus serotina* from California and on *P. ussuriensis*, both of which induce a high proportion of black end.

Batjer (L. P.), Rogers (B. L.), & Thompson (A. H.). **'Blossom blast' of Pears: an incipient boron deficiency.**—*Proc. Amer. Soc. hort. Sci.*, 62, pp. 119–122, 2 figs., 1953. [Received May, 1954.]

Symptoms of boron deficiency in pears [*R.A.M.*, 32, p. 321 and next abstract] were expressed in some orchards in north central Washington as a blossom blast, the blossom on affected trees wilting and dying and frequently remaining on the tree until the following year, while the leaves appeared healthy. The conditions associated with blossom blast suggest that the low boron content (11 to 30 p.p.m.) in infected trees, often followed by a rise to a normal level, is due to their inability to obtain sufficient boron from heavy, waterlogged soil in the spring. Foliage sprays containing boron (2 lb. boric acid per 100 gals.) given a week before full bloom are remarkably effective in eliminating this disorder, whereas soil applications were ineffective.

Degman (E. S.). **Effect of boron sprays on fruit set and yield of Anjou Pears.**—*Proc. Amer. Soc. hort. Sci.*, 62, pp. 167–172, 1953. [Received May, 1954.]

A pear orchard in Oregon, showing the severe blossom blast and die-back symptoms of boron deficiency [see preceding abstract] responded excellently with increased yield, better growth, and less die-back to boron-containing sprays at blossom time in 1952. No evidence was obtained of an increase in fruit setting of Anjou pears resulting from boron sprays, but beneficial effects to the trees resulted when deficiency symptoms were present originally.

Kobel (F.). **Zur Diagnose des Steinobstvirosen.** [On the diagnosis of stone fruit viroses.]—*Phytopath. Z.*, 20, 4, pp. 353–374, 6 figs., 1953. [English summary.]

Information gleaned from about 50 North American publications on the symptomatology and diagnosis of stone fruit viroses [*R.A.M.*, 33, p. 362] is presented, with special reference to the use of index hosts in grafting experiments. Mention is also made of the colour tests and ultra-violet absorption measurements of Lindner *et al.* [31, p. 420]; the author's trials at Berkeley, California, by the latter method gave equivocal results [cf. 32, p. 387].

Jensen (D. D.). **Leafhopper-virus relationships of Peach yellow leaf roll.**—*Phytopathology*, 43, 10, pp. 561–564, 1953.

Tested individually in daily transfers to 809 peach trees at the Department of Entomology and Parasitology, University of California, Berkeley, only two out of 43 individuals of *Colladonus geminatus* acquired peach yellow leaf roll virus [*R.A.M.*, 31, p. 614; cf. 32, p. 615] during a two-day feeding period. The virus was transmitted to only four peach trees. In an experiment in which a common source plant was used the numbers of leafhoppers becoming viruliferous during acquisition feeding periods of 24 hours, five days, and ten days were one out of 64, 17 out of 61, and nine out of 65, respectively.

In successive transfers to healthy test plants at daily or weekly intervals, as long as 19 days sometimes elapsed between transmissions by viruliferous individuals, which retained the virus, however, for up to 72 days. The maximum latent period of the virus in the leafhopper was from 64 to 71 days, though in most individuals it was less than 45. The incubation time for the virus in greenhouse-grown Lovell peach seedlings ranged from 21 to 90 days with a modal period of 31 to 40.

McClung (A. C.). **Magnesium deficiency in North Carolina Peach orchards.**—*Proc. Amer. Soc. hort. Sci.*, 62, pp. 123–130, 2 figs., 1953. [Received May, 1954.]

A marginal chlorosis and interveinal necrotic spotting of peach leaves on sandy soil in North Carolina are attributed to magnesium deficiency, and were reduced by soil applications of magnesium sulphate. The magnesium content of mid-shoot leaves from untreated trees was 0·13 to 0·19 per cent. and rose to 0·31 to 0·39 after treatment.

Rhoads (A. S.). **Clitocybe root rot found widespread and destructive in Georgia and South Carolina Peach orchards.**—*Plant Dis. Reptr*, 38, 1, pp. 42–46, 1 fig., 1954. [Multilithed.]

During recent surveys *Clitocybe tabescens* was isolated from the roots of bearing peach trees in decline and recently dead replants in orchards in several localities in Georgia and South Carolina [*R.A.M.*, 32, p. 682]. To prevent spread of the disease all attacked trees should be removed before they become unproductive or die. The development of sporophores under favourable soil moisture conditions, particularly in the autumn, if the soil has not been heaped up to an unusual depth, should facilitate the location of affected trees. The importance of removing and burning all roots, which can serve as sources of infection for several years, is strongly emphasized and the use of a grubbing hoe before replanting is recommended.

Hills (C. H.), Calesnick (Eleanor J.), Dryden (E. C.), & Gaspar (Mildred S.). **Ferbam residues on canned Montmorency Cherries.**—*Proc. Amer. Soc. hort. Sci.*, 62, pp. 261–266, 1953. [Received May, 1954.]

An investigation at the Eastern Regional Research Laboratory, Pennsylvania, revealed that the concentration of ferbam spray residues on fresh commercial Montmorency cherries was approximately 2 p.p.m. [*R.A.M.*, 33, p. 364] and in the canned product, where it becomes decomposed, 0·5 p.p.m. Ferbam was undetectable by taste in canned cherries until a concentration of 3·3 p.p.m. was reached, obtained by adding 10 to 20 p.p.m. to the fresh fruit. It is concluded that ferbam residues have no adverse effect on the storage or palatability of tinned cherries.

McIntosh (D. L.). **Verticillium wilt of Sweet Cherry in British Columbia.**—*Plant Dis. Reptr*, 38, 2, pp. 74–75, 2 figs., 1954. [Multilithed.]

Of 220 three-year-old sweet cherry seedlings growing at the Experimental Station, Summerland, British Columbia, 202 were infected by *Verticillium dahliae* [cf. *R.A.M.*, 31, p. 61] in 1953. The symptoms varied considerably, but wilting, fading, and occasional yellowing of the leaves, at first affecting one or more spurs, then spreading upwards and resulting by the end of August in complete defoliation of the one-year-old wood of the leader, was fairly general. In some cases there was only slight upward and inward marginal rolling of leaves on the one-year wood, followed by premature autumn colouring or, sometimes, by considerable defoliation, progressive stages in symptom development being observed together on single leaders. On other trees the syndrome resembled that already described [4, p. 495], with rapid yellowing, wilting, drying, and shedding of the leaves. The disease usually progressed upwards rather than laterally and the intensity of discoloration in the vascular system varied from light to dark brown or black depending on the severity of external symptoms. The fungus was isolated from affected branches and occasionally from the spurs.

Chambers (J.). **Heat therapy of virus-infected Raspberries.**—*Nature, Lond.*, 173, 4404, pp. 595–596, 1954.

At the Scottish Horticultural Research Institute, Mylnefield, Invergowrie, in

1952, Lloyd George raspberry canes were freed from unidentified latent viruses [*R.A.M.*, 31, p. 439; 32, p. 682] and Malling Jewel from a mixture of viruses, including leaf spot, by subjecting the growing plants to an air temperature of 32° C. for periods of one to four weeks [cf. 32, p. 683; 33, p. 306]. Absence of symptoms in *Rubus henryi*, to which the treated plants were grafted, is at present assumed to imply freedom from any of the known raspberry viruses [32, p. 387]; the plants have been so tested twice. In experiments begun in July, 1953, vigorously growing plants in 5-in. pots were defoliated, packed in trays of damp peat moss, and transferred to a square box (3 ft.) maintained at a constant temperature; light was supplied for 17 hours daily. Batches of plants of the two varieties previously used and Norfolk Giant infected with leaf mottle virus, and Malling Promise with latent viruses were maintained at 32° for various periods. From three lots of 16 plants treated for eight, ten, and 12 days, respectively, three, eight, and five virus-free plants have been obtained so far. No cures were effected in an earlier trial in which plants were kept for four days at 32°; longer than eight days is necessary to give a high proportion of cures.

Scott (D. H.), Jeffers (W. F.), Waldo (G. F.), & Ink (D. P.). **Resistance of Strawberry varieties and selections to races of the red stele fungus.**—*Proc. Amer. Soc. hort. Sci.*, 62, pp. 306–310, 1953. [Received May, 1954.]

A review of the recent literature on the varietal reaction of strawberries to different races of *Phytophthora fragariae* [*R.A.M.*, 32, p. 633] leads the authors to point out that there is a possibility of all named varieties eventually being attacked. In 1952, for example, it was reported from Maryland that plants of Temple [29, p. 469] were infected, and from New Jersey that the variety Sparkle [loc. cit.] showed symptoms of the disease. Greenhouse tests showed that two selections, Md-US-2149 and Md-US-2159, are resistant to all three known races of *P. fragariae* occurring in Maryland [32, p. 388].

Eide (P. M.) & McLean (D. M.). **A simple aphid cage for virus transmission studies.**—*Plant Dis. Reptr*, 38, 1, pp. 10–11, 1 fig., 1954. [Multilithed.]

A simple aphid cage, used successfully at the Northwestern Washington Experiment Station in strawberry virus transmission studies [cf. *R.A.M.*, 32, p. 440], is a clamp with two balsa wood arms, $2\frac{1}{2}$ by $\frac{3}{4}$ by $\frac{3}{32}$ in., fastened together at one end with a cork and organdie hinge and held closed over the leaf with a rubber band. A circular hole is cut in the free end of each arm and cork collars are cemented round the two holes to make close contact with opposite surfaces of the leaf. A non-transparent cage is made by cementing a piece of organdie over one of the holes. A transparent cage can be assembled from a celluloid disk supported on a short cylinder of lumite screen, which is inserted in the hole. The aphids may be placed in the cage or directly on the test plant and the cage clamped over them. For fasting periods a piece of paper is inserted between the collars. The cage is light in weight and easily manipulated.

Contois (D. E.). **Microflora of the rhizosphere of the Pineapple plant.**—*Soil Sci.*, 76, 4, pp. 259–272, 1953.

At the University of Hawaii, using a quantitative-qualitative method [which is fully described] based on calculation of the reciprocal ratios of arbitrarily defined nutritional groups, the author found no difference between the microbial populations of samples collected over a period of 19 months from the inner and outer rhizospheres of pineapple plants ranging from one month to two years old. A suggestive difference was observed, however, between the mycofloras of plants

grown in Wahiawa and Helemano, the latter locality being situated at a higher altitude and having a heavier annual rainfall and a lower soil pH than the former, while the root rot caused by *Phytophthora cinnamomi* [*R.A.M.*, 30, p. 423] is prevalent there, according to a personal communication from E. J. Anderson, Pineapple Research Institute, Honolulu. The samples from Wahiawa yielded predominantly species of *Aspergillus* (including *A. terreus* and *A. wentii*) and *Penicillium* (*P. brevi-compactum*, *P. chrysogenum*, *P. frequentans*, *P. janthinellum*, *P. lapidosum*, *P. rubrum*, and *P. wortmannii*), while *Circinella simplex* and *Rhizopus nigricans* [*R. stolonifer*] were the most common species detected in material from Helemano. Other fungi encountered in the course of the studies were *Cephalosporium coremioides*, *Hormodendrum* [*Cladosporium*] *hordei*, *H. resinae*, *Trichoderma glaucum*, *T. lignorum* [*T. viride*], and (occasionally) unidentified species of *Gliobotrys*, *Phoma*, *Pestalotia*, *Chaetomella*, and *Acrothecium*.

Pontis Videla (R. E.) & Rodríguez Landaeta (A.). **El 'oidio' o 'blanco' de la Lechoza (Carica papaya L.) en Venezuela, causado por Oidium caricae Noack.** [*Oidium* or mildew of Papaw (*Carica papaya* L.) in Venezuela caused by *Oidium caricae* Noack.]—*Agron. trop., Maracay*, 2, 1, pp. 55–57, 1 fig., 1952.

In December, 1950, papaw seedlings at the National Institute of Agriculture, Maracay, Venezuela, were attacked severely by mildew (*Oidium caricae*) [*R.A.M.*, 27, p. 483] shortly after being potted. Later the disease was observed in the seed-beds and on older plants in commercial plantings at Villa de Cura (Aragua) and Chirgua (Carabobo), but the damage incurred was not serious. This is the first record of the disease in Venezuela. The fungus developed on the upper leaf surface of seed-bed plants and transplanted seedlings [cf. 6, p. 42] but on the lower leaf surface of older plants.

Ciferri (R.). **Cinque anni di esperienze con anticrittogamici a base di etilenbis-ditiocarbamato di zinco.** [Five years of experiments with fungicides with a zinc ethylene bisdithiocarbamate base.]—*Notiz. Malatt. Piante, 1953*, 23 (N.S., 2), pp. 3–19, 1953.

In tests in different parts of Italy from 1949 to 1953, inclusive, dithane Z-78 (0·3 per cent. aqueous solution at 300 to 400 l. per ha. for herbaceous plants and 5 to 20 l. per plant for trees) was compared with other materials. Against scab (*Venturia inaequalis*) [*R.A.M.*, 32, p. 303] on Reinette de Canada apple trees over 12 years old eight applications of the fungicide gave 0·3 per cent. infected fruits compared with 1·8 and 2·2 for Bordeaux mixture (0·75–0·75–100 for the first three, then 1–1–100) and calcium polysulphide (2 per cent. for the first, 1 per cent. for the remainder), respectively. The chief advantage of dithane Z-78 is that it can be used on varieties susceptible to russeting.

Sclerotinia fructigena [cf. 33, p. 90] on Rome Beauty apples was reduced to 1·1 per cent. by six applications of dithane Z-78, as against 2·2 per cent. for calcium polysulphide (1·5 per cent.) and 7·3 per cent. for the untreated. The treatment also appeared to provide protection against late infection of apples by *Alternaria mali* and gave good control of *Septoria piricola* [*Mycosphaerella sentina*] on pear. Control of peach brown rot (*Sclerotinia fructigena* and *S. laxa*) [cf. 29, p. 286] was obtained with dithane Z-78 plus 0·1 per cent. commercial wetter, and on cherry four applications of dithane Z-78 reduced the percentage infection by *Cladosporium carpophilum* from 21 to 6·7 and by *Gloeosporium fructigenum* [*Glomerella cingulata*] from 5·1 to 0·1. The material also gave satisfactory control of *Taphrina deformans* on peach leaves [32, p. 303] and *T. pruni* on plum fruits [cf. 27, p. 26].

Numerous tests demonstrated that it was as effective as Bordeaux (1–1–100) against vine mildew (*Plasmopara viticola*) [32, p. 605] but gave no control of

Oidium [*Uncinula necator*: 32, p. 362] and should, therefore, be mixed with an equal quantity of wettable sulphur before use. It also controlled grey mould (*Botrytis cinerea*) [cf. 33, p. 203] and white rot (*Coniothyrium diplodiella*) [cf. 32, p. 419] of grapes.

Three applications of dithane Z-78 between July and September, inclusive, controlled *Cycloconium oleaginum* on olive [28, p. 467]. Four to eight applications made throughout the spring and summer eliminated rose rust (*Phragmidium subcorticum*) [*P. mucronatum*] and appeared to control black spot (*Actinonema* [*Diplocarpon*] *rosae*). On azalea two applications (in April and May) had a strongly preventive effect on *Exobasidium discoideum* [*E. azaleae*], and probably reduced leaf spot (*Septoria azaleae*) [cf. 27, p. 463]. Six to seven applications from August to November and four to six from February to April on carnations against *Uromyces caryophyllinus* [*U. dianthi*: see above, p. 425] gave an index of infection of 0·22, as against 27·45 for Bordeaux (1-1–100 and 2–2–100) and 62·3 for the untreated. Dusting gladiolus corms before storage with dithane Z-78 gave excellent control of *Penicillium gladioli* [30, p. 107] and *Fusarium oxysporum* [f.] *gladioli* [loc. cit.; 33, p. 296].

In repeated tests dithane Z-78 was as effective against potato blight (*Phytophthora infestans*) [cf. 33, pp. 73, 109] as Bordeaux (1–1–100). On tomato it controlled *P. infestans* at 0·3 per cent., *Alternaria solani* [32, p. 347] at 0·4 to 0·45 per cent., and *Cladosporium fulvum* at 0·5 to 0·6 per cent. (four applications in 1951, five in 1952). Infection by *Septoria lycopersici* was completely prevented on the treated plants.

In smaller tests dithane Z-78 controlled *Sclerotinia minor* [cf. 29, p. 404] on lettuce, *Bacillus carotovorus* [*Erwinia carotovora*], *Septoria apii-graveolentis*, and *Cercospora apii* on celery, and *Albugo candida* [*Cystopus candidus*] and *Peronospora parasitica* on cabbage. When Burley tobacco seed was sown in pots in soil naturally infested with *Pythium debaryanum* [30, p. 348] but previously treated with aqueous solutions of dithane Z-78 (0·3, 0·5, and 1 per cent.) in quantities up to saturation point the percentage seedling mortality after 15 days was, respectively, 11·3, 9·6, and 8·3, as compared with 0·9 after heat sterilization and 81·3 in untreated soil.

Miller (L. P.), McCallan (S. E. A.), & Weed (R. M.). **Accumulation of 2-heptadecyl-2-imidazoline, silver, and cerium by fungus spores in mixed and consecutive treatments.**—*Contr. Boyce Thompson Inst.*, 17, 5, pp. 283–298, 1953.

When conidia of *Neurospora sitophila*, *Sclerotinia fructicola*, *Aspergillus niger*, *Glomerella cingulata*, and *Venturia pirina* were exposed to various combinations of 2-heptadecyl-2-imidazoline (with labelled carbon), silver (as silver nitrate with labelled silver), and cerium (as cerium sulphate with labelled cerium) in further experiments with radio-active tracers at the Boyce Thompson Institute for Plant Research, New York [cf. *R.A.M.*, 32, p. 576 and next abstract], they absorbed the materials at about the same rate and to about the same degree whether the toxicants were administered singly, simultaneously, or consecutively. Materials absorbed were not released on resuspension in water or on further treatment with a second toxicant. It appears, therefore, that the receptor sites of the toxicants are not the same.

Treatment previously or simultaneously with tergitol 7 interfered seriously with the uptake of 2-heptadecyl-2-imidazoline but did not affect that of silver or cerium. The spores absorbed cerium but hardly any sulphate. The toxicants were removed from the spores with difficulty even after only brief contact. The 2-heptadecyl-2-imidazoline could be extracted with ethanol, while nitric acid was required to remove most of the cerium and silver.

Weed (R. M.), McCallan (S. E. A.), & Miller (L. P.). **Factors associated with the fungitoxicity of ferbam and nabam.**—*Contr. Boyce Thompson Inst.*, 17, 5, pp. 299–315, 1 fig., 1953.

At the Boyce Thompson Institute for Plant Research, New York, ferbam [*R.A.M.*, 33, p. 39] labelled with S^{35} emitted a volatile sulphur compound which was readily absorbed by conidia of *Monilinia* [*Sclerotinia*] *fructicola* and *Aspergillus niger* and spores of *Rhizopus nigricans* [*R. stolonifer*: cf. preceding abstract] and by tomato, bean (*Phaseolus vulgaris*), and cotton plants. Labelled carbon disulphide obtained from the ferbam by treatment with strong acid was also absorbed by bean plants. The carbon disulphide was identified by means of paper chromatograms as the sulphur-containing volatile decomposition product of ferbam and nabam [33, p. 308]. The amount emitted increased considerably as the pH values fell below 7. Ferbam decomposition was partially reversed by glutathione and cysteine; nabam was affected by oxidized glutathione. It was shown that carbon disulphide is metabolized by green plants.

These reactions are probably important in the toxic action of the fungicides. Ferbam inhibited the sulphhydryl-dependent enzyme urease but nabam had little effect. For testing the fungistatic and fungicidal effectiveness of volatile toxicants and for studying the ability of various absorbing solutions to remove the toxicants, the slide with spore drops was placed on a glass ring standing in a dish of the liquid inside a Stender dish. A Soxhlet thimble in the fungicide gave increased surface to the solution. Preliminary results indicated that neither carbon disulphide nor ethylenediamine is the volatile toxicant from nabam solutions [loc. cit.; cf. 31, p. 194] and that it is probably not a diisothiocyanate.

Plant Diseases.—Yearbook of Agriculture 1953, United States Department of Agriculture, xviii+940 pp., 32 col. pl., 15 figs., 2 graphs, 1 map, Washington D.C., United States Government Printing Office, 1953. $2.50.

This is an outstanding work, invaluable to every student of plant pathology, and containing an important summary of agricultural research in the United States, on which nearly $43,000,000 was spent in 1952. The most recent information on the cause and control of diseases of the chief crops is presented in this volume, of which nearly 300,000 copies have been printed.

Experts in each field have contributed papers under the headings (*a*) costs and causes, in which Jessie Wood (pp. 1–9) states that $3,000,000,000 in the U.S.A. are lost yearly through plant diseases; (*b*) bases of controls; (*c*) growing healthier plants, including an article by F. J. Stevenson and H. A. Jones (pp. 192–216) giving sources of resistance in plants and the mode of inheritance; (*d*) grasses and legumes; (*e*) cotton; (*f*) food and feed grains; (*g*) vegetable crops; (*h*) sugar crops; (*i*) tobacco; (*j*) some ornamentals; (*k*) fruits and nuts; (*l*) after harvest; and (*m*) some others.

An important feature of the book is the coloured plates, each illustrating symptoms of four different crop diseases.

Clifton (C. E.), Raffel (S.), & Barker (H. A.). **Annual review of microbiology. 7.**—ix+505 pp., Stanford, California, Annual Reviews, Inc., 1953. $7.

The literature on the genetics of micro-organisms (202 titles) is surveyed up to December, 1952, on pp. 47–82 of this review [cf. *R.A.M.*, 33, p. 102] by O. Wyss and F. L. Haas, under the headings of methods, the origin of variation in micro-organisms, the mutation process, sexual recombination in bacteria, cytology, and mutant studies.

H. E. Pearson (pp. 179–196) discusses (with 139 references) the biochemical

aspects of virus growth, with emphasis on the metabolic inhibitors of virus propagation, including that of tobacco mosaic virus.

The field of industrial fermentations is dealt with by G. A. Ledingham (pp. 433–460), citing 235 references from 1947 until February, 1953. The subjects covered are antibiotics, alcohols, organic acids, vitamins, and enzymes, and the production of food by biosynthesis is reviewed.

Report of the Food Investigation Board 1952.—London, H.M. Stationery Office, 56 pp., 1953.

E. C. Bate-Smith reports (pp. 14–24) from the Low Temperature Research Station, Cambridge, that the precise chemical reactions involved in the production of physiological injury in stored fruit and vegetables by high tensions of oxygen have been established. The browning of potato tissue in pure oxygen is due to the depletion of the reserves of malic acid and possibly of iso-citric acid.

R. G. Tomkins reports (pp. 41–46) from the Ditton Laboratory, Kent, that further work on lenticel rotting of apples by *Gloeosporium perennans*, with special reference to attack on Cox's Orange Pippin, is being carried out. *G. perennans* is able to attack the flesh of unripe apples and also apples in the early stage of storage.

Thorn (W. A.) & Zentmyer (G. A.). **Hosts of Phytophthora cinnamomi Rands.**—*Plant Dis. Reptr*, 38, 1, pp. 47–52, 1954. [Multilithed.]

This list of the known hosts of *Phytophthora cinnamomi* [*R.A.M.*, 31, p. 152; 33, p. 243], arranged alphabetically under the Latin names and giving the country of origin for each report, is obtained from a survey of the literature (59 titles) up to July, 1953.

Nopitsch (M.). **Mikroorganismen als Schädlinge von Textilien und Leder.** [Microorganisms damaging textiles and leather.]—*Ciba-Rdsch., 1953*, 108, pp. 3944–3973, 27 figs., 1 graph, 1953.

A comprehensive, tabulated survey of the available information on bacterial and fungal damage to textiles [cf. *R.A.M.*, 31, p. 394] and leather is presented under the following headings: the discovery of the microbes; microbial damage to (1) wool and other animal fibres, (2) spinning materials derived from plants, (3) fishing-nets, and (4) leather; identification, culture methods, and preventive treatments.

[A translation of this paper appears as No. 100 in the English series of *Ciba-Rdsch., 1953.*]

Ruperti (A.). **Textilkonservierung mit Arigal A.** [Textile preservation with arigal A.]—*Ciba-Rdsch., 1953*, 108, pp. 3985–3986, 1 fig., 1953.

Permanent protection against bacterial and fungal damage to textiles, especially cotton, was secured in the author's experiments at Ciba Ltd., Basel, Switzerland, by treatment with arigal A at a concentration of 5 per cent. for wrapping materials and 7·5 for fishing-net yarns. The chemical is dissolved 'in three times the quantity of cold water', into which a solution of 1 gm. gelatin per l. and 0·8 per cent. crystalline copper chloride is slowly stirred, and finally a 10 to 20 per cent. solution of 10 per cent. ammonium chloride is added. After a few minutes' impregnation in the bath, yarns are kept for two hours in a closed container at 80° C. before drying, while piece goods are dried immediately and hardened for five minutes at 140° to 150°.

DeVay (J. E.). **Biochemical studies of sex and pathogenicity in Ustilago zeae (Beckm.) Ung.**—*Diss. Abstr.*, 13, 5, p. 656, 1953. [Mimeoprinted. Received April, 1954.]

Studies were conducted at the University of Minnesota to determine whether

physiologically active substances could be detected which controlled sexual and pathogenic compatibility between haploid lines of *Ustilago zeae* [*U. maydis*: *R.A.M.*, 31, p. 13 and above, p. 420] and whether certain biochemical characteristics [33, p. 248] were specific for any one sex group. Inoculations of haploid line $10A_4$ plus cell-free culture filtrates of the compatible haploid line $17D_4$ into maize seedlings at the six- to eight-leaf stage caused stronger curl reactions than comparable inoculations with $10A_4$ plus sterile water. Similar results were obtained with cells of $17D_4$ plus cell-free culture filtrates of $10A_4$. There were quantitative and qualitative differences in the free amino acid content of the cultures. The extract of line $10A_4$ contained an unknown ninhydrin-reacting compound not found in the other extracts. There was distinct variability in the virulence of certain crosses between haploid lines. Both albino and green maize seedlings developed smut galls.

Shaw (M.), Brown (S. A.), & Rudd Jones (D.). **Uptake of radioactive carbon and phosphorus by parasitized leaves.**—*Nature, Lond.*, 173, 4408, pp. 768–769, 6 figs., 1954.

In a co-operative study by the Department of Biology, University of Saskatchewan, and the Prairie Regional Laboratory, Saskatoon, the damaged tissue of pricked or wounded uninfected leaves fed with phosphate (labelled with phosphorus-32) [cf. *R.A.M.*, 33, p. 248] and labelled sugars (glucose-1 ^{14}C, ribose-1 ^{14}C, and xylose-1 ^{14}C) [33, p. 106] was usually less active physiologically than that in undamaged areas. No tracers entered dead areas and there was no activity in or around the lesions produced on broad bean by *Botrytis* sp. which kills the host tissue in advance. Moderate accumulation was observed in young infections and also round, but not within, older infections of *Pseudomonas medicaginis* f.sp. *phaseolicola* on bean (*Phaseolus vulgaris*). There was no accumulation in young infections of *Helminthosporium* sp. on wheat and less radioactivity (from glucose) in young lesions produced on oats by *Pseudomonas coronafaciens* than in surrounding healthy tissue. After 20 hours a diffuse zone of increased activity was observed round old, large lesions of *Helminthosporium* on wheat. In short, the results obtained with these facultative parasites were generally similar to those obtained by mechanically wounding healthy tissue.

The results obtained with rusts (*Puccinia graminis* on wheat and barley and *P. helianthi* on sunflower) and mildew (*Erysiphe graminis* on wheat and barley) were more striking; from three to four days following inoculation of susceptible hosts there was rapid and marked accumulation of radioactivity, particularly in the mesophyll beneath the mycelium. The parasite depressed photosynthesis in the invaded tissue and induced an influx of fixed carbon-14 (supplied as carbon dioxide). Marked inhibition of the process was secured with phloridzin and with dinitrophenol (both at 1m*M* in phthalate buffer at pH 5·5). Accumulation of activity and starch deposition were far more pronounced in susceptible than in resistant-type rust and mildew infections. Starch formation also, formerly attributed to a breakdown in translocation [6, p. 603], is probably the result of transference to the site of infection. It is of interest that, in the case of rust, the starch is deposited in a distinct ring which, in young infections, closely surrounds the uredosori but later becomes separated from them by a starch-free zone. It is essential for successful obligate parasitism that substrates be supplied to the invaded cells at a rate high enough to maintain their organization and metabolism in the presence of the parasite. Whether or not the latter obtains adequate material for continued growth must depend on the relative rates of utilization and transportation. The observations here support the hypothesis that one or more substances diffusing from the site of infection alters the normal metabolism of the host tissue and that its concentration may be regarded as governing the rate at which metabolites move into the infection

site and the magnitude of supply to both parasite and parasitized cells. It seems obvious that at least in the case of obligate parasites the rate of movement of substrates both towards and away from the primary infection must play an important part in determining susceptibility to disease.

Smith (Mary C. W.). **The nutrition and physiology of Entomophthora coronata (Cost.) Kevorkian.**—*Diss. Abstr.*, 13, 5, pp. 648–649, 1953. [Mimeoprinted. Received April, 1954.]

Studies at the University of Michigan on the nutrition and physiology of *Entomophthora coronata* [*R.A.M.*, 30, p. 415] revealed that it grew well in a purely synthetic medium containing mineral salts, arginine HCl, glucose, and distilled water.

Hollis (J. P.). **Studies on Streptomyces scabies II. Stimulation of melanin production by amino acids.**—*Bull. Torrey bot. Cl.*, 81, 2, pp. 98–103, 1 graph, 1954.

Most of this information on *Streptomyces* [*Actinomyces*] *scabies* from the Department of Botany, University of Missouri, Columbia, has already been noticed from another source [cf. *R.A.M.*, 33, p. 252]. Growth was inhibited by tyrosine when this was the only amino acid present, but increased progressively as tyrosine was used when stimulatory amino acids, singly or in combination, were added.

Kozłowska (A[niela]). **Z zagadnień wpływn wysokich temperatur i wilgotności gleby na nasilenie wirusa X w tkance Ziemniaka.** [On the problems of the influence of high temperatures and soil humidity on the increase of virus X in Potato tissue.]—*Acta agrobot.*, 1, pp. 11–32, 1 graph, 1953. [English summary. Received May, 1954.]

In further studies at Cracow, Poland, on the increase in virus X protein in potato tissues [*R.A.M.*, 31, pp. 75, 254, and next abstract], carried out during the period 1949–53, it was found that a rapid rise in temperature (up to 50° C.) in May, during the first growth period of potato plants, resulted in a considerable increase in the virus. Lower temperatures in June and July did not decrease the disease significantly. Plants from tubers of these, however, contained the same amount of virus X as plants from other tubers of the same year. In greenhouse experiments in 1952 with temperatures reaching up to 40° a distinct increase in virus protein was observed in 10 per cent. of the plants only. The maximum temperature (40° to 50°) for the virus *in vitro* has a decisive influence on the quantitative increase of the virus in living tissues, increasing the content one hundredfold, but it does not cause any change of the virus strains. Increase in soil humidity does not alter the amount of virus X in potato tissues.

Prochal (P.). **Rozmieszczenie utajonego wirusa X w bulwie Ziemniaczanej.** [The distribution of the masked virus X in Potato tubers.]—*Acta agrobot.*, 1, pp. 33–77, 6 figs., 13 graphs, 1953. [English summary. Received May, 1954.]

Complement fixation tests to determine the distribution of the masked potato virus X strain [see preceding abstract] in pieces of dormant potato tubers at the Jagiellon University, Cracow, Poland, showed the maximum concentration to be in the vascular tissue. It enters there first during growth and spreads all over the tuber, concentration being next greatest in the pith, the cortex, and the external part of the pith, in descending order. Similarly, virus concentration was greater in the top eyes than in the basal ones, which contained no virus whatever in lightly infected tubers. In stored tubers the virus moves from the base to the top, reaching its climax in the spring, thereby diminishing its content in the basal parts. Potato tubers imported from Pomeranian plant breeding stations contained only low X

virus concentrations which, however, increased gradually when plants were grown under the conditions of the experiment. In stock No. 44 the concentration diminished in the fourth year of growing. Starch content is higher in non-infected than in infected tubers, and tends to diminish as the virus concentration increases. It is independent of variety differences. The average percentage reduction of starch in tubers infected with viruses X and Y [cf. *R.A.M.*, 33, pp. 108, 171] varies between 3·5 and 6 or more.

Raychaudhuri (S. P.). **Dilution curve of a ring-spot strain of Potato virus X.**—*Amer. Potato J.*, 30, 6, pp. 134–136, 1 fig., 1 graph, 1953.

In experiments at the Rockefeller Institute for Medical Research, New York, batches of *Gomphrena globosa* plants grown from healthy seeds supplied by Cornell University were inoculated with sap from *Nicotiana glutinosa* leaves containing a ring spot strain of potato virus X [*R.A.M.*, 29, p. 637]. One leaf was treated with sap at one dilution and the other leaf at the same node with another. The results obtained showed that there was a sharp decline in the activity of this strain of potato virus X when diluted from 1 in 5 to 1 in 25 and from 1 in 625 to 1 in 3,125.

Simpson (G. W.), Bonde (R.), Merriam (D.), Akeley (D. F.), Manzer (F. E.), & Hovey (C. L.). **Procedure in field testing Potato seedlings for leafroll resistance.**—*Bull. Me agric. Exp. Sta.* 502, 14 pp., 5 figs., 1952.

A method adopted in Maine for testing potato varieties on a field scale for resistance to leaf roll virus [*R.A.M.*, 32, p. 143 and next abstract] consists in infesting seedlings with viruliferous *Myzus persicae* propagated on cultivated swede plants and rendered viruliferous on infected potato. The resistant seedlings are selected and screened each season for five years. A high percentage of seedlings was rejected the first year but as survivors from the field test at Highmoor Farm and from the aphid test at Aroostook Farm were used more frequently as parents the degree of resistance became greater.

The results to date from testing more than 51,000 seedlings, while not yet providing a desirable, commercially acceptable variety, have at least indicated where leaf roll resistance may be found. Further selection and recombination of characters should provide a variety capable of reducing losses from the virus.

Webb (R. E.), Larson (R. H.), & Walker (J. C.). **Relationships of Potato leaf roll virus strains.**—*Res. Bull. Wis. agric. Exp. Sta.* 178, 38 pp., 12 pl., 1952.

In experiments at Wisconsin Agricultural Experiment Station to determine the causes underlying the variable response of potato varieties to leaf roll virus [see preceding abstract] under comparable conditions, it was found that *Physalis floridana* was the most suitable indicator plant. Isolates were secured from 148 infected tubers from various States by inoculation of *P. floridana*, establishing the presence of four distinct virus strains with varying degrees of severity of reaction on *P. floridana*. *Myzus persicae*, which was used for transmission in all the tests, acquired the virus after a six-hour feeding period and, after a latent period of 30 hours, transmitted it to healthy plants in the course of two-hour feeding periods.

The severity of reaction of *P. floridana* affected with strains 1, 2, and 3 differed at temperatures of 16°, 20°, 24°, and 28° C., recovery and subsequent growth of the plants increasing with temperature, whereas plants infected with strain 4 were defoliated and killed at 24° and 28°. At 35° symptoms of all strains were masked for a 20-day period but developed rapidly on return to 24°.

Low levels of nitrogen, phosphorus, and potassium in *P. floridana* attenuated symptoms caused by strains 1 and 3; high levels accentuated them. Strain differences were distinguishable at the various levels.

Each strain protected *P. floridana* and potato seedling 41956 from reinfection by the other strains. The extent of phloem necrosis in *P. floridana* was correlated with the severity of aerial symptoms. Indicator plants growing in the same pot showed root transmission.

Greenhouse experiments at 24° showed the consistency in reaction of six potato varieties to each individual virus strain, but varied responses to different strains. Tolerance varied with variety, not with the virus strain; but reactions in the field were not correlated with greenhouse reactions. Tolerance increased with lateness in planting of infected tubers and decreased with increasing light.

Barker (W. G.) & Page (O. T.). **The induction of scab lesions on aseptic Potato tubers cultured in vitro.**—*Science*, 119, 3087, pp. 286–287, 2 figs., 1954.

In experiments at the Department of Botany, Ontario Agricultural College, Guelph, a pure culture of a known pathogenic strain (isolate P 21) of *Streptomyces* [*Actinomyces*] *scabies* in sterile distilled water was applied to the unwounded surface of an aerial potato tuber cultured aseptically *in vitro*; a scab lesion was most readily induced by applying the inoculum to a tuber surface in contact with the wall of the culture vial. Common scab lesions appeared on rapidly enlarging Katahdin tubers within ten days of inoculation and only at the inoculation site. There was no evidence of any bacterial or fungal contaminant, only *A. scabies* being responsible for lesion formation. In the lesions intracellular filaments of *A. scabies* were detected under the microscope. After successive passages through the host, resulting in lesion formation, and subsequent recoveries in pure culture, the causal organism displayed no apparent attenuation of pathogenicity.

Dearborn (C. H.), Babb (M. F.), & Kallio (A.). **Knik, a new Potato variety for Alaska.**—*Amer. Potato J.*, 30, 6, pp. 148–149, 1953.

Knik, a good quality, culinary potato variety developed in Alaska from a cross of Arctic Seedling with the Minnesota selection 56–1, was rated second in resistance to scab [*Actinomyces scabies*: cf. *R.A.M.*, 32, p. 504] in the 1952 variety trials in comparison with five other varieties and 19 numbered seedlings, Ontario being the most resistant. Knik produced the highest yield of US No. 1 tubers when spaced at 9 in. It was released for increase in 1952.

Thirumalachar (M. J.). **Rhizoctonia solani infections of Potato tubers in India.**—*Phytopathology*, 43, 11, pp. 645–647, 4 figs., 1953.

Two types of potato tuber infection caused by *Rhizoctonia* [*Corticium*] *solani* were investigated at the Central Potato Research Institute, Patna, Bihar, India [*R.A.M.*, 3, p. 78; 5, p. 213; 10, p. 224; 16, p. 231], one identical with the 'dry core' described by Ramsey (*J. agric. Res.*, 9, pp. 421–426, 1917) and the other not hitherto reported. Dry core was prevalent on the O.N. 45 variety, the large tubers of which were heavily infested by sclerotia, while the marketability of about 5 per cent. was reduced by depressions. The affected areas, at first pustulate, gradually dry up and are transformed into a powdery mass, which ultimately leaves a crateriform depression.

The other type of infection by *C. solani* was observed in 5 to 10 per cent. of the tubers of the Darjeeling Red Round variety at the Potato Certification Substation, Kufri, at an altitude of 8,500 ft. above sea-level in the Himalayas. The hard, dry rot with internal browning, which may easily be mistaken for blight [*Phytophthora infestans*], turns into a spongy mass, very light in weight, during storage. The strain of *C. solani* involved is characterized by atypical golden-brown hyphae and sclerotia. Plated on potato dextrose agar in different combinations, some of the isolates displayed mutual aversion by the formation of thick sclerotial barriers

[cf. *R.A.M.*, 14, p. 645]. Inoculation with this strain resulted in the development of browning and dry rot in 20 out of 25 tubers, the wounded but uninoculated controls remaining healthy.

Bonde (R.). **Preliminary studies on the control of bacterial decay of the Potato with antibiotics.**—*Amer. Potato J.*, 30, 6, pp. 143–147, 1 fig., 1953.

Large losses from bacterial soft rot occurred in potato storage houses in central Maine during the 1952–3 season. Experiments conducted to determine whether antibiotics could be used to control bacterial decays in stored potato tubers and seed pieces showed that dihydrostreptomycin sulphate and streptomycin sulphate (both at 10 to 30 p.p.m.) were very effective against the black leg organism, *Erwinia atroseptica*, on cut tuber slices, but did not inhibit the decay caused by *Pseudomonas fluorescens*. Aureomycin was effective against *P. fluorescens*. The results indicate that possibly the treating solutions should contain several antibiotics in order to inhibit the different types of pathogens.

Lutz (J. M.). **Fusarium tuber rots of late Potatoes as related to injuries and certain chemical treatments.**—*Amer. Potato J.*, 30, 6, pp. 131–134, 1953.

Red Pontiac, Pontiac, and Triumph potatoes damaged by digger cuts, bruises, or skinning were examined at the United States Department of Agriculture, New York, after the harvests of 1950 and 1951 for tuber rot caused by *Fusarium* spp. Nearly two-thirds of the potatoes with moderate digger cuts, over one-third with slight cuts, about one-third with moderate bruises, and slightly less than one-tenth with slight bruises rotted, whereas less than 4 per cent. of apparently sound potatoes rotted. Treatment with seven different fungicides had no effect in reducing storage rot [cf. *R.A.M.*, 30, p. 428; 31, p. 294; 33, p. 313].

Whitehead (T.), McIntosh (T. P.), & Findlay (W. M.). **The Potato in health and disease.**—Third edition—xv+744 pp., 87 figs., Edinburgh & London, Oliver & Boyd, 1953. 60*s*.

This is a complete revision of the second edition [*R.A.M.*, 25, p. 357]; the larger part, chapters XX to XXIX, is devoted to the diseases of the potato and arranged under similar headings [loc. cit.]. The treatment of virus diseases is considerably expanded, covering the deterioration of potato stocks, viruses in relation to potato degeneration, the relation between virus and plant, and the spread of virus diseases under field conditions (chapters XXVI to XXIX). An appendix contains a list of fungicides with directions for use, and there is an extensive bibliography of phytopathological references (pp. 592–644).

Borders (H. I.) & Ratcliff (T. J.). **A mosaic of Sweetpotato in plant beds and fields in Georgia.**—*Plant Dis. Reptr*, 38, 1, pp. 6–9, 1 fig., 1 map, 1954. [Multilithed.]

Sweet potato mosaic virus [*R.A.M.*, 11, p. 535; 33, p. 48] was reported in Georgia for the first time in 1945 and again in 1946; in 1952 it caused 100 per cent. infection in some fields and by 1953 had spread to 15 counties in the coastal plain. In greenhouse experiments the virus was transmitted by grafting to healthy sweet potato plants. The results of one season's observation and experiment in the field indicate that it is not soil-borne but is carried by an insect vector.

Saccas (A. M.) & Fernier (H.). **Une grave maladie du Riz due à Ophiobolus oryzinus Sacc.** [A serious disease of Rice due to *Ophiobolus oryzinus* Sacc.]—*Agron. trop., Nogent*, 9, 1, pp. 7–20, 7 figs., 1954.

A detailed study is given of the history, geographical distribution, symptoms,

and morphology of *Ophiobolus oryzinus* [*R.A.M.*, 32, p. 449], which in 1952 caused fatal wilting in 3 to 4 per cent. of the rice plants of 27 varieties growing under irrigation at the Central Agricultural Experiment Station, Boukoko, Ubangui-Chari, French Equatorial Africa. On corn meal agar the fungus formed radiating, olivaceous-brown colonies with a greenish sheen and a flocculent aerial mycelium. The perithecia on the host measured 155 to 415 μ in diameter (average of 25, 325 μ), with a conical to subcylindrical neck 90 to 112 μ long by 90 to 100 μ wide. The asci measured 72 to 123 by 10·5 to 14·5 μ (average of 50, 102·8 by 12·7 μ), and the ascospores were 70 to 115 by 3·4 to 4·6 (average, 86·4 by 4·2) μ.

In field experiments M 32 plants inoculated by spraying with an ascospore suspension when 15 to 20 cm. high and bearing three leaves developed yellowing of the first two leaves after ten days; after 12 days all those with three or four leaves had withered. Similar results were obtained with M 80, inoculated before earing when bearing four to five leaves. The first symptoms developed after 12 days, and a fortnight later, when earing started, 55 of 200 plants were dead. Earing commenced on 72 inoculated plants, but no seed had formed by 12th October. The remaining inoculated plants failed to ear and died on 28th October. Inoculations at a later stage of growth had less serious results, but 10 to 20 per cent. of the seed was malformed and maturation was retarded by 15 to 20 days.

The evidence demonstrated that penetration almost always takes place by way of the first leaf sheaths at the base. Infection invariably results in appreciable reduction of tillering or (more often) its complete suppression, with resultant loss in yield. The wilting and death of young infected plants are due to profound alterations in the tissues of the leaf sheaths and culm bases induced by the mycelium. At all stages of growth the tissues of the leaf sheaths are penetrated by the hyphae; the fungus is, however, unable to invade the sclerotic tissues of the culms. Perithecia appear on the leaf sheaths 30 to 45 days after infection.

The optimum temperature for ascospore germination at 100 per cent. humidity is between 26° and 27° C.; at 35° germination is arrested, and at 40° the ascospores are killed. With optimum temperature conditions germination takes place rapidly when the ascospores are in contact with a drop of water, more slowly in saturated air, and not at all in non-saturated.

Control consists in the destruction of all foci of infection.

Corbetta (G.). **Ricerche e esperienze sulle malattie del Riso (Oryza sativa L.). VIII. La malattia del Riso da Sclerotium oryzae Catt. (= Helminthosporium sigmoideum Cav. = Leptosphaeria salvinii Catt.).** [Researches and experiments on diseases of Rice (*Oryza sativa* L.). VIII. The Rice disease caused by *Sclerotium oryzae* Catt. (= *Helminthosporium sigmoideum* Cav. = *Leptosphaeria salvinii* Catt.).]—*Phytopath. Z.*, 20, 3, pp. 260–296, 8 figs., 1 diag., 5 graphs, 1953. [English and German summaries.]

The author's comprehensive study at the Institute of Plant Pathology, University of Milan, on the rice disease caused by *Leptosphaeria salvinii* (with 153 contributions to the literature) showed that the life-cycle of the fungus in Italy proceeds as in the United States [*R.A.M.*, 13, p. 395]. The conidial and perithecial states have long been known in Italy [16, p. 405] but their genetic connexion was not hitherto recognized. Biometrical and statistical analyses, *in vivo* and *in vitro*, of the sclerotial dimensions of several Italian isolates in comparison with material from the United States, India, and Japan [32, p. 694] revealed morphological and cultural variations suggesting the presence of genetically different strains.

The results of inoculation experiments showed the principal effects of the pathogen to be a collapse of the culm parenchyma and destruction of the cell walls. Overwintering is accomplished by means of sclerotia and possibly conidia but not by perithecia. The disease is endemic and virtually ubiquitous in Italy, but seldom

causes appreciable damage unless the infected plants are weatherbeaten. The most effective control measures are the cultivation of resistant varieties, e.g., Chinese original, American 1600, Race 77, and Balilla, and cultural practices, such as deep ploughing, which promote the accumulation of moisture and thereby contribute to the destruction of the sclerotia.

Norton (D. C.). **Linear growth of Sclerotium bataticola through soil.**—*Phytopathology*, 43, 11, pp. 633–636, 2 graphs, 1953.

Of recent years charcoal rot (*Sclerotium bataticola*) [*Macrophomina phaseoli*: see below, p. 451] has become the major disease of guayule [*Parthenium argentatum*: *R.A.M.*, 26, p. 168] in Texas. In 1951 the linear growth rates of an isolate of the fungus from this host were measured by the tube method of Ryan *et al.* [23, p. 268], using a modification of the technique of Eaton *et al.* (*Plant Physiol.*, 22, 1, pp. 181–192, 1947). The fungus was cultured at 25°, 30°, 35°, and 40° C. and at soil moisture-levels of 5, 10, 15, and 20 per cent. The optimum temperature for growth of *M. phaseoli* on yeast extract dextrose agar and in sterile fine sandy loam was 35° and the most favourable moisture-levels 5 and 10 per cent. Development in unsterilized soil, with or without a food base, was very restricted.

It would appear from these observations that the hot, dry weather usually associated with charcoal rot of *P. argentatum* conduces to the progress of infection more by weakening the vigour of the host than by stimulating the movement of the pathogen through the soil.

Rehm (H.-J.) & Rehm (Ursel). **Untersuchungen über die Bodenmikroflora von Gatersleben und Umgebung (mitteldeutsches Lössgebiet). 1. Mitteilung: Untersuchungen über die Verbreitung von einigen Bodenpilzen und Bodenbakterien unter antibiotischen und phytopathologischen Gesichtspunkten.** [Studies on the soil microflora of Gatersleben and environs (central German loess region). Communication 1: Studies on the distribution of some soil fungi and soil bacteria from the antibiotic and phytopathological standpoints.] —*Kulturpflanze* (*Ber. Inst. Kulturpfl Forsch.*), 1, pp. 111–121, Akademie-Verlag, Berlin, 1953.

The actinomycetes isolated from samples of field, forest, garden, and greenhouse soil at the Institute for Cultivated Plant Research, Gatersleben, near Aschersleben [Saxony], on glucose-peptone-malt-yeast or Czapek-Dox media were represented mainly by *Streptomyces* spp. [cf. *R.A.M.*, 32, p. 613], including *S. albus*, some strains of which exerted a powerful antibiotic action on *Fusarium orthoceras* and *F. oxysporum*. There were 39 strains of *Penicillium*, mostly of the *Asymmetrica* group, a number of which secreted anti-bacterial substances.

From the phytopathological angle the most important fungi isolated were *Botrytis cinerea*, *Verticillium* spp., especially *V. albo-atrum*, *Trichothecium roseum*, *Cladosporium herbarum*, *C. fulvum*, *Stemphylium piriforme*, *F. nivale* [*Calonectria nivalis*], *F. equiseti*, and *F. oxysporum*.

Farrow (W. M.). **Tropical soil fungi.**—*Diss. Abstr.*, 13, 5, pp. 642–643, 1953. [Mimeoprinted. Received April, 1954.]

An account is given of the isolation, culture, classification, and distribution of 141 species of soil fungi representing 78 genera isolated from 31 soil samples collected in Panama and Costa Rica, the majority being from Barro Colorado Island.

Rieuf (P.). **Note sur un dépérissement du Ricin.** [A note on a wilt of the Castor plant.]—*Rev. Path. vég.*, 32, 2, pp. 120–129, 2 pl., 1953.

In the spring of 1952 *Ricinus communis* plants, a new crop for Morocco, being tested in plots at Rabat, developed a form of stem decline. Lesions occurred a few

centimetres above the collar and spread up the stem to a distance of 15 to 20 cm. The skin dried and sometimes developed superficial cracks with *Fusarium* sporodochia, the tissues were destroyed along the whole surface of the stem, the leaves wilted, dried, and fell, beginning at the apex, and finally the branches withered.

F. sambucinum (*Gibberella pulicaris*) was found on affected stems along with *Rhabdospora ricini* n.sp., *Physalospora ricini* n.sp., *Diplodia organicola* n.sp. [all without Latin diagnoses], and *Rhizoctonia* [*Corticium*] *solani*. *P. ricini* has gregarious, subepidermal perithecia measuring 250 to 300 μ in diameter and cylindro-clavate, shortly pediculate asci measuring 100 by 20 μ with ascospores 24 to 25 by 8 to 10 μ; *Rhabdospora ricini* has pycnidia 400 to 450 μ in diameter, and pycnidiospores 15 to 16 by 1 to 1·5 μ; *D. organicola*, possibly the imperfect form of *P. ricini*, has pycnidia 170 to 200 μ wide by 190 to 230 μ long, and ovoid, reddish-brown pycnidiospores 22 to 25 by 13 to 15 (average 23·5 by 14) μ with a verrucose wall. Other fungi found were *Macrophoma* [*Macrophomina*] *phaseoli* [see below, p. 451] associated with a collar necrosis leading to die-back, *Phoma macropyrena* on dead branches, *Melampsorella* [*Melampsora*] *ricini* on the leaves [cf. *R.A.M.*, 32, p. 591], *Alternaria compacta* on stems and leaves, and *Botrytis cinerea* on flowers and fruits.

Kulkarni (Y. S.), Patel (M. K.), & Dhande (G. W.). **Bacterial leaf-spot of Cassia tora L.**—*Indian Phytopath.*, 5 (*1952*), 2, pp. 76–88, 1 pl., 1953.

This is an expanded account of information already noticed from another source [*R.A.M.*, 31, p. 86] on bacterial leaf spot (*Xanthomonas cassiae*) of *Cassia tora* in India, where the plant is used for medicinal purposes, for a blue dye, and increasingly as a substitute for coffee.

Chona (B. L.) & Nariani (T. K.). **Investigations on the survival of Colletotrichum falcatum Went in soil.**—*Indian Phytopath.*, 5 (*1952*), 2, pp. 152–157, 1953.

The survival in soil of *Colletotrichum falcatum* [*Physalospora tucumanensis*: *R.A.M.*, 31, p. 87; 33, p. 381] was investigated at the Indian Agricultural Research Institute, New Delhi [cf. next abstract]. In cultures on sterilized soil and soil-compost mixtures hyphae and pink spore masses developed after inoculation, and the spores remained viable up to five and six months on the two media, respectively. In unsterilized soil and soil-compost neither hyphae nor spores could be traced after one month, but it could not be ascertained whether they were killed or failed to develop owing to competition with other micro-organisms, or whether they could not be traced owing to the presence of these numerous other fungi. The conidial state survived for three months and can presumably live for about the same period under natural conditions. Growth in soil is greatly favoured by the addition of compost.

Chona (B. L.) & Srivastava (D. N.). **The perithecial stage of Colletotrichum falcatum Went in India.**—*Indian Phytopath.*, 5 (*1952*), 2, pp. 158–160, 1 pl., 1953.

Perithecia of *Physalospora tucumanensis* were produced on inoculated autoclaved pieces of sugar-cane leaf and leaf sheath at the Agricultural Research Institute, New Delhi [cf. preceding abstract]. The natural occurrence of perithecia has been recorded in the United States and Formosa [*R.A.M.*, 31, p. 299; and the Gold Coast—*Mycol. Pap.*, *C.M.I.*, No. 50, p. 56, 1953] only.

Arruda (S. C.). **A produção da muda seleccionada de Cana em face da doença 'carvão'.** [The production of selected Cane setts in the presence of the smut disease.]—*Biológico*, 19, 7, pp. 127–133, 1 fig., 2 diags., 1953.

Evidence is adduced from recent field observations in São Paulo, Brazil, for the

spread of secondary infection by sugar-cane smut (*Ustilago scitaminea*) [*R.A.M.*, 33, p. 261], involving the important commercial variety Co.290. The sole means of prevention is a drastic reduction in the movement of setts. Any nursery with even a single case of the disease should be disqualified from further production. Not only factories, but small-scale growers, should maintain nurseries for the production of smut-free setts with not more than a trace of sugar-cane mosaic virus or leaf scald [*Xanthomonas albilineans*: loc. cit.], to be inspected four times a year beginning two months after planting. Once all foci of active smut sporulation in susceptible varieties have been eliminated it should be practicable, by the measures indicated above, to maintain the incidence of secondary infection in resistant canes within reasonable limits. Resistant varieties may be planted in areas where an infected, susceptible stand has been totally eradicated, but previous planting with another crop, such as maize, is advisable to ensure the complete absence of 'volunteers'.

Moreau (F.). **Les champignons. Tome II.** [The fungi. Volume II.]—*Encycl. mycol.*, 23, pp. 941–2120, 825 figs., 8 diags., 2 graphs, Paris, Paul Lechevalier, 1954. Fr.15,000.

The second volume of this exhaustive, fully documented treatise follows the same lines as the first [*R.A.M.*, 32, p. 264] and comprises the third part, dealing with the taxonomy of fungi. Chapter XXXII is concerned with generalities; XXXIII with fungus-like organisms; XXXIV to XXXVIII with the Mastigomycetes (with motile spores); XXXIX and XL with the lower Amastigomycetes or Zygomycetes; XLI with generalities of the higher Amastigomycetes or Dangeardiomycetes; XLII with the simple Ascomycetes; XLIII to XLVII with the Carpascomycetes; XLVIII and XLIX with the Protobasidiomycetes; L with the Dangeardiomycetes intermediate between the Protobasidiomycetes and Basidiomycetes *sensu stricto*; LI with generalities on the Eubasidiomycetes; LII to LV with the Hymenomycetes; LVI with the Gasteromycetales; LVII with the Fungi Imperfecti; and LVIII with phylogeny.

Petrak (F.). **Beiträge zur Kenntnis der Pilzflora Irans.** [Contributions to the knowledge of the fungus flora of Iran.]—*Sydowia*, 7, 1–4, pp. 50–78, 1953.

Two new subgenera, 16 new species, and three new combinations are described in this further critically annotated list of Persian fungi [*R.A.M.*, 33, p. 320]. *Uromyces lentincolus* n.sp., parasitic on lentil leaves and petioles (occasionally also on the stems), differs from other *U.* spp. on the same host in its globose or subglobose, very rarely broadly ellipsoid or ovoid, chestnut-brown teleutospores.

Stagonospora citrorum n.sp., an apparently weak parasite associated with *Ascochyta citri* and *Discosphaeria eugenea* in the formation of large, irregular, pale ochraceous lesions on citrus leaves, produces globose or broadly ellipsoid pycnidia, 100 to 180 μ in diameter, and cylindrical, straight or curved, uni- to triseptate, hyaline conidia, 18 to 27 (mostly 20 to 23) by 5 to 6·5 μ, borne on cylindrical or cylindro-conical conidiophores, 4 to 7 by 3 to 3·5 μ.

Other records include *Septoria graminum* [26, p. 173] on oats, *Hormiscium oleae* on olive leaves, and *Naemospora microspora* on branches of walnut.

Petrak (F.). **Ein Beitrag zur Pilzflora Floridas.** [A contribution to the fungus flora of Florida.]—*Sydowia*, 7, 1–4, pp. 103–116, 1953.

A study of C. L. Shear's collection of fungi from Florida resulted in the erection of three new species and six new combinations, the latter including *Phyllostictina citricarpa* (*Phoma* [*Guignardia*] *citricarpa*) on rotting citrus leaves [C.M.I. map No. 53].

Among numerous other records may be mentioned *Eutypella cocos* on coco-nut.

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